EDUCATIONAL

PSYCHOLOGY

SECOND EDITION

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Preface

Important developments are taking place in educational psychology, notably the increasing emphasis on child development, the growing acceptance of an organismic view, the ramifications of the guidance movement, and the recognition of the contribution that the school must make to its pupils as members of a democratic society. In addition, a closer articulation of psychological theory with its application to school practice is demanded.

The theme of pupil adjustment, which not so long ago was an innovation in educational psychology, now tends to merge into that of individual and social development through the processes of learning in a regulated environment. In this volume, therefore, the balance has been corrected by the inclusion of chapters on the influence of the environmental structure, both physical and social, and on learning in the motor and esthetic areas as well as in those more purely symbolic.

The author is fully aware of the conflicts as yet unresolved between associationist, psychoanalytic, and field theories, as well as of other uncertainties within the conceptual framework of each system. It is his belief, however, that the problems that confront the teacher can be more clearly understood through a judicious use of concepts derived from different sources, each of which tends to make up for deficiencies in the other. For example, the Gestalt work on perception elaborates the meaning of stimulus situation, just as earlier the psychoanalytical view of conflict and frustration threw light on the problem of motivation.

While the vocabulary and concepts employed have not been simplified or "watered down," the effort has been made to clarify the ideas and concepts presented and to relate them to ordinary school and life situations as well as to laboratory and other research studies.

With the increasing need for a psychological understanding of human problems, the author is of the opinion that all the knowledge, training, and experience one can obtain are needed for the proper execution of the task imposed by society on the educator. It is his hope that this book, even better than its 1931 predecessor, will serve as an introduc-

tion to an understanding of children and youth as they grow and learn, and further that it will inspire each one who reads it to learn more, and to become a worthy member of the educational profession in whatever phase of the work he may be called upon to serve.

Wm. Clark Trow

Contents

3. Growth and Development

4. Learning Processes

5. Learning Experiences

Educational Psychology

Introduction: What is Educational Psychology?

This first introductory chapter is a kind of airplane view of the area known as educational psychology. We need such a view in order to get the "lay of the land" and to see the relation of the parts to each other. The area is an extensive one, and the boundaries are not sharply defined. They contain several more or less loosely connected parts which constitute the subject matter of different courses or disciplines. This book will provide a sort of orientation tour through a number of them. All together, they embrace what may be called the study of *the psychological aspects of educational situations*. We shall first inquire into what is meant by "educational situations," and then see what "psychological aspects" means. After that, we shall be in a better position to appreciate the contribution of educational psychology to teaching as a profession.

1. EDUCATIONAL SITUATIONS

The Public Schools. In the public schools are found the great majority of educational situations with which trained personnel are called upon to deal. The system of public education, which is set up and supported by society to assure its continuance, is truly a stupendous enterprise. From the purely financial point of view, it involves an annual expenditure, in this country alone, of more than three billion dollars. The schools reach approximately thirty million children and adults, housed during the working day in more than two hundred fifty thousand school buildings, and instructed by approximately a million teachers.

Special Schools. Naturally, educational situations are to be found in many other kinds of schools; some of these operate under other than

state auspices, and are dominated by widely varying objectives. There are private boarding schools, church and parochial schools, vocational and professional schools, and training schools for the armed forces. There are schools in hospitals, in prisons, and in institutions for the feeble-minded and insane. There are schools for those with physical handicaps, for the blind and partially sighted, for the deaf and hard of hearing, for the crippled, and for many others. And besides all these there are courses giving special training in various phases of business and industry, including part-time and on-the-job training, to say nothing of a vast amount of individual instruction in the form of private lessons in music, foreign languages, and many other subjects. The learners range from infants in the nursery schools to mature individuals participating in adult education programs.

Other Educational Agencies. But a great deal of what may properly be called education is carried on in other than formal teaching situations. Among these are the activities of such organizations as the Boy and Girl Scouts and other youth groups, and of many adult clubs and fraternal orders with educational programs involving lectures or discussions. Churches, libraries, and museums likewise have a definite educational function. And homes, which probably have more influence than any other institution—perhaps more than all the rest combined—should likewise be thought of as educational agencies. It is in the millions of homes throughout our land that children acquire the ways of thinking, speaking, and behaving, and the basic attitudes and ideals, which determine in large measure the kind of children they are and the kind of adults they will become.

Also numbered among educational agencies are the great institutions for public enlightenment and entertainment, the press, the radio, and the motion picture. It is impossible to determine the educational influence of these great institutions, carried on as they are in this country almost entirely under private auspices, and regulated only by a minimum of legislation, by codes of fair practice, and by public approval and disapproval. Important as these agencies are, it must be said, in all fairness, that their influence in many instances runs counter to what the people have accepted as desirable for the schools. What children hear over the radio or see at the movies educates them, but sometimes in a way which makes their formal education more difficult.

What Is Education? All of the situations mentioned may be classified as educational in that individuals become a part of an environmental

structure in which they learn something. There have been many definitions of education written from different points of view, and often including a statement of the objectives sought. From the psychological point of view, however, *education is essentially human development in a controlled environment.* The direction people want the development to take varies somewhat in different cultures and in different groups. In some cases it is quite specific, and in others not clearly defined, but in all cases some modification of behavior is expected. The controlled environment involves some kind of social structure, and the nature and degree of control may vary from a carefully planned lesson to the incidental contacts of neighborhood play groups. While our chief concern is with the institutions in which education is the primary function, the influence of the others should not be underestimated.

2. Psychological Aspects

Psychology. Defined as the *science of behavior,* psychology enters into the study of man wherever he is and whatever he is doing. On the basis of his fundamental biological structure, he is sensing, perceiving, attending, feeling, expressing emotion, thinking, and reasoning, whether he is engaged in selling life insurance, driving an automobile, or attending a concert, memorizing a poem, or teaching arithmetic. Psychology has a dual allegiance—to the biological sciences and to the social sciences. While one of these often tends to be emphasized somewhat to the exclusion of the other, the educator is necessarily concerned with both.

Psychology as Subject Matter. Since we are to explore the psychological aspects of educational situations, our airplane view can show us some of the ramifications of psychology and its related disciplines (1) as subject matter, (2) as research technique, and (3) as professional service. Psychology as subject matter ranges all the way from the study of the function of nerve cells and muscle fibers, for example, to the interaction of an individual and his cultural group, i.e., from physiological psychology on the one hand to social psychology on the other. At the one extreme are the related biological sciences such as biochemistry, genetics, and neurology; at the other are the social and philosophical fields of sociology, cultural anthropology, ethics, logic, and esthetics. Thus psychology occupies a middle ground, sometimes inclining toward the natural, and sometimes toward the social and humanistic, disciplines.

The subject matter of psychology is usually divided into a number of more or less overlapping fields which may be listed as follows:

> Physiological psychology
> Comparative, or animal, psychology
> Genetic psychology, or the psychology of
>   childhood, adolescence, and maturity
> Psychology of esthetics
> Educational psychology
> Industrial psychology
> Abnormal psychology
> Individual differences
> Social psychology
> Clinical psychology

Psychology as Research Techniques. The differentiating factor distinguishing the various fields of subject matter is the nature of the data or phenomena with which they are concerned. To investigate such widely diverse phenomena requires different research techniques, which may be grouped as follows:

1. The techniques of the biological laboratory, including the surgical and the microscopic
2. The techniques of the psychological laboratory, including the observation and report of various aspects of behavior and mental functions such as reaction time and memory
3. The techniques of individual and group testing, measurement, and evaluation and the statistical treatment of data
4. The techniques of sociology, such as the interview, the questionnaire, the survey, and the observation and interpretation of group behavior

The order in which these are presented reveals a kind of gradient from the study of the more minute aspects of human nature to its grosser aspects, sometimes referred to as lower and higher levels of explanation. Psychologists tend to specialize at some point along this gradient. Those who do so are sometimes inclined to overemphasize the importance of their specialization. From a more objective point of view, no one aspect is any more important than any other.

Psychology as Professional Services. Besides being a body of organized knowledge, in adding to which various research techniques are employed, psychology has also come to be a profession.[1] Psychologists may,

[1] P. M. Symonds, "A New Meaning for Educational Psychology," *Journal of Educational Psychology*, vol. 30 (January, 1939), 33–37; also W. C. Trow and M. S. Smart, "Psychologists Report Their Training Needs," *Journal of Consulting Psychology*, vol. 7 (January–February, 1943), 27–40.

of course, be teachers of psychology and research workers. But, in addition, they are coming more and more to offer professional services, drawing chiefly on knowledge and training in abnormal psychology, individual differences, and social psychology. Some are in private practice, others are members of clinics or service centers, while others offer psychological services for social and educational institutions, such as prisons, hospitals, and different kinds of schools.

The psychologist who has a professional knowledge of *abnormal psychology*, including the various forms of maladjustment, may work as a mental hygienist, consultant, or clinician, assisting those who are afflicted with mental ailments to a better adjustment to life situations. He shares responsibility in this work with the medically trained psychiatrist, or neurologist, who is called upon to care for those who are so disturbed as to be called insane and to need hospitalization. The psychologist, on the other hand, usually confines his attention to those troubled with relatively minor mental ailments.

The psychologist who has specialized in the study of *individual differences*, sometimes called a psychometrist (or psychometrician), administers various tests—achievement, intelligence, personality, and others, usually to aid in the educational or vocational guidance of the individual. He may be expected to decide which of the hundreds of tests available should be used, and to devise and construct new ones for specific purposes.

Lastly, the psychologist who is more concerned with problems in the field of *social psychology*, sometimes referred to as a case worker, may interview individuals, obtain their case histories, and recommend such treatment as may reduce the harm they can do society—or, better, improve their contribution to it. Such recommendations, for example, may be for custodial or for foster-home care. He shares responsibility in this work with the sociologist. If any line can be drawn between the work of the two—for frequently it seems to differ in name only—it might be that the interest of the social case worker is in the social or institutional environment of the child or adult, while that of the psychologist is in the adjustment of the individual to that environment. It can readily be seen that in actual practice such a differentiation would tend to break down.

While the type of professional service rendered by psychologists has been differentiated into that of clinician, psychometrist, and case worker, more frequently than not a professional psychologist will be found performing all these duties. If a child is referred to a psychological service center by some social agency because of some delin-

quency, the psychologist, in conference with the child and his parents, may help him to meet his adjustment problems more satisfactorily, may administer certain tests to aid in his better classification in school, and may recommend transfer to some other class or school or other institution on the basis of what is found in his case history.

Educational Psychology as Applied Psychology. From what has been said above, it might seem quite proper to view educational psychology as *psychology applied to education.* Such a delineation would be only in part correct, depending on how the applications are made. Psychological principles and theories derived from experiments in the psychological laboratory are not properly applied if they are taken over intact and used in the educational sphere without further question as to their applicability. Such practice was formerly more common than it is now. Psychological principles and theories require considerable adaptation when applied to educational practice. This is because the scientifically controlled conditions of the laboratory may be expected to produce different results from those obtained in the more complex environment of the typical school. A rat in a maze or a subject learning nonsense syllables with an exposure apparatus is in a different situation from that of a child learning arithmetic in a schoolroom.

If, however, an applied science is recognized as a field in itself, educational psychology may be called an applied science. For the educational psychologist studies educational problems as they may arise, applying psychological principles and theories to educational situations tentatively, as hypotheses. He employs and adapts psychological techniques. He may presumably develop some of his own, as has been done, for example, in the case of different kinds of testing and instructional procedures in school situations.

But there is another caution that should be observed. The individual psychology of the traditional laboratory is not all that should be "applied," but all that goes under the heading of social psychology as well.[2] The latter is basically the study of the individual in his relationships to other individuals. Hence we may define educational psychology as *individual and social psychology applied to education.* If the various aspects already discussed are brought together, the definition of educational

[2] S. H. Britt, "Social Psychologists or Psychological Sociologist—Which? *Journal of Abnormal and Social Psychology*, vol. 32 (October–December, 1937), 314–318; also E. B. Reuter, "The Status of Social Psychology," *American Journal of Social Psychology*, vol. 36 (November, 1940), 293–304; and S. Q. Janus, "On the Data of Social Psychology," *Journal of Social Psychology*, vol. 12 (November, 1940), 387–392.

psychology becomes *the study of the application of individual and social psychology as subject matter, research techniques, and professional services to human development in a controlled environment.*

3. HUMAN RELATIONS AND HUMAN DEVELOPMENT

Space-Time Behavior Patterns. From the preceding section it might be concluded that the study of educational psychology is only for those who are planning to become professional educational psychologists. Such, however, is by no means the case. A teacher, principal or superintendent, a parent, visiting nurse, social worker, or preacher is employing principles of educational psychology, effectively or otherwise, whether he knows it or not. It may be well to examine in some detail the kinds of data with which educational psychology is primarily concerned. It will then be possible to see more clearly why all persons contributing to the individual and social development of others will find it advantageous to study it.

The data of educational psychology are to be found in the segments of behavior which are referred to as behavior patterns. All are familiar with two-dimensional patterns, from the simple geometric figures to complex designs. Equally familiar are three-dimensional patterns—marbles, blocks, machinery, sculpture—in short, objects. The data of the natural sciences are primarily some group of such objects of the so-called animal, vegetable, or mineral "kingdoms."

All are likewise familiar with the temporal dimension, in the ticking of a watch, or in musical themes of melodies, which have no spatial existence. The data of the social sciences combine this temporal dimension with the spatial dimensions. The results are space-time patterns, which are equally familiar, as in a football play or a dance step, in which persons move.

Individual and Group Interaction. In the interest of greater simplicity we shall confine our classification of the space-time patterns that form the data of educational psychology to the behavior of pupils in the usual school environment. They may be translated, as one may wish, into other environments: into player-playground, patient-hospital, client-office, and the like. A number of interpersonal relationships with a few examples of conditions influencing these relationships are given below.[3] The first group contains the traditional content of educational psychology; the second and third groups, deriving from social psychology, are

[3] W. C. Trow, "Educational Psychology—Individual or Social?" *Journal of Consulting Psychology*, vol. 5 (November–December, 1941), 265–269.

properly receiving increasing recognition. The fourth is more purely sociological.

1. Person-to-symbol

Pupil responses to the cultural heritage of words and numbers—perhaps the most fully explored, but knowledge is far from complete concerning them.

2. Person-to-person

Teacher-pupil: The effect of each on the response of the other. Mutual affection or aversion; the effect on the pupil of scolding, threatening, encouraging, rewarding, of neurotic tendencies, and counseling; the effect on the teacher of uncleanliness, dishonesty, flattery, diffidence, aggression, etc.

Pupil-pupil: The responses of one pupil to the behavior of another. Crushes, friendships, rivalries, aversions, and aggressive behavior; co-operation and competition.

Teacher-teacher: Teacher interactions. Friendships, rivalries, aversions.

3. Person-to-group

Teacher-class: The effect of the teacher-controlled environment on the pupils. Discipline, autocratic and democratic control, teacher personality, prestige, leadership; the use and effects of marks, test scores, and ratings.

Pupil-school: The influence of subgroups on the pupil. Classes, grades, homerooms, clubs, teams, cliques, gangs, and secret societies; leadership, status, popularity, acceptance, exclusion, rejection; loyalty, altruism, imitation, custom, fad, and fashion.

Pupil-home (including neighborhood and community): The effects of home background on pupil behavior. Socio-economic status, overprotection, rejection, parent fixation, sibling rivalry, etc., which influence the pupil's responses to the educational program.

Teacher-faculty: Consequences of faculty rôle and status on teacher development and effectiveness. Age, salary, experience; conservative or progressive school structure; type of administrative control, morale.

Teacher-community: Effects of community on teacher development and effectiveness. Familiarity, size, predominant economic activities, wealth, nationality origins, folkways, mores, demands on the teacher.

4. Group-to-group

Faculty-school: Morale, esprit de corps.

Faculty-administration: Teacher participation, autocratic or democratic controls, teacher organizations.

School-community: Resources, support of the program, participation of
pupils and staff.

A teacher has much to learn besides the subject he is supposed to teach
if he is to participate effectively in the various relationships in which he
will be involved. Some of these relationships have been studied fairly
intensively;[4] others have tended to be neglected, or left to the rather
dubious direction of "common sense." Many of the unfortunate mistakes
which teachers make, some of which result in their failure on the job, are
not in the area of subject-matter knowledge at all, or even of teaching
method, but are in the realm of adjustment in human relationships, with
which educational psychology deals.

4. CONTRIBUTIONS OF EDUCATIONAL PSYCHOLOGY TO THE TEACHING PROFESSION

Attributes of a Profession. While educational psychology provides a
basis for understanding all situations in which individual development
may take place in a more or less carefully controlled environment, the
nature of its contribution to the teaching profession should also be ex-
plored. What, then, does teaching have in common with other occupa-
tions that are classified as professions? And what is gained by studying
educational psychology in preparing to become a teacher? There are four
chief attributes of a profession: knowledge, research, techniques, and
judgment.[5] It is important that due weight be given to all four, since an
overemphasis on one or two, to the neglect of the others, produces an
imbalance both in preparation and practice.

Knowledge. What should a teacher know? The members of every
profession must be in possession of a certain body of organized knowl-
edge relating to their work. For teaching, this applies not only to the
subject matter that is to be taught, but also to the knowledge needed for
teaching itself, whatever the course content. The professional knowledge
of the teacher, apart from his subject-matter specialization, used to be
called Pedagogy and is now called Education.

Those who are expecting to become teachers, in order to participate
intelligently in planning, should know something of the methods of ad-
ministering the work, including finance and budgeting, school architec-
ture, personnel organization, and public relations. They must know of

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[4] See, for example, Bernice Baxter, *Teacher-Pupil Relationships,* New York:
Macmillan, 1943.

[5] W. C. Trow, "Teaching as a Profession," *University of Michigan School of
Education Bulletin,* vol. 16 (November, 1944), 20–23.

the expanded curriculum and its current reorganizations, the vocational and avocational objectives, and the efforts being made to adjust the school to the needs of pupils ranging in ability from high-grade feebleminded-ness to sheer genius. They must know something of the history of educa-tion, its underlying philosophy, and the current practices in other lands. They must know what experience and science have found out concerning the nature of children to be educated, and the way they feel and think and learn. And they must realize that the subject matter is but a means to their more complete individual and social development.

Several of these branches of knowledge are included in whole or in part within the field of educational psychology. Since the professional man is one who *knows,* or at least should know, it is almost impossible to overemphasize the importance of the knowledge aspect of preparation. It is overemphasized only when other aspects are neglected.

Research. What are the sources of professional knowledge? Where does it come from? There are many sources—for example, tradition, borrowings from other professions, individual experience, and scientific research. Every profession is constantly in the process of overhauling its accumulated body of professional knowledge, throwing out the junk and replacing it with scientifically substantiated facts. The hunches of the past, the traditional lore, the restricted experience of individuals, and even the much-needed "common sense," are often in error, and controlled investigations are needed to separate the wheat from the chaff.

Laboratories and research stations are constantly at work on the prob-lem of correcting the weaknesses and errors of the past and obtaining new knowledge that can be used more effectively than what was previously available. The research that is carried on in one professional field is often of value in other fields as well as in the one where it originated, and the researches in one science may have important implications for others. So there is a constant free exchange of information for the benefit of all.

Few teachers have time to conduct any very extensive research in addition to their regular duties, though they can contribute to it in many ways. Essentially, however, they are consumers of research, and a great deal of it is within the psychological area. They must understand about it and be able to use the results intelligently. Otherwise the research would be useless, since the results would never come in contact with the actual educational process for which they are intended.

Techniques. What must a teacher be able to do? A member of any profession must be competent in certain activities that require training and practice. He must be a technician, a craftsman, an artisan, in com-

mand not only of routine skills, but also of more difficult techniques. Hence in the preparation of teachers, although techniques and methods should not be sacrificed even to knowledge and research, the teacher must be able to do the things he is called on to do, not only in the classroom, but in other relationships as well. For example, he must be able to speak and write clearly, to explain things, to direct a discussion, to plan cooperatively, to interview pupils and parents, perhaps to run a motion picture projector, or administer standardized tests. To perform such acts as these, many of which are psychological skills, training and practice are necessary.

Judgment. On the basis of his command of a body of knowledge, his acquaintance with research, and his techniques, the professional worker must be able to exercise a high degree of judgment. He will be expected to give advice or render an opinion. He will be expected to *diagnose* a confused and troublesome situation and point out the significant conditions involved. He will be expected to be able to give a *prognosis*, or to prophesy the outcome within certain limits of probability if matters are left alone, or if certain kinds of action are taken. And he will be expected to know what is the best course of *treatment* to pursue. Trade training is not enough for this, since conditions are rarely the same. The medicine that is good for one person with a particular disease may be harmful to another with the same symptoms. Other conditions enter in to change the picture, and the professional man must know the kinds of conditions to look for, how they may be recognized, and what to do about them.

It should be admitted at once that the problems of human behavior are too complex to admit as much precision in such judgments as could be desired. We don't know, for example, what should be done about all types of truancy, or all cases of lack of interest in school work. We do know that the same thing should not be done in every case, and we know that a great many of the things that are commonly done in such cases are quite inadequate, if not positively harmful. But a teacher should not be too discouraged if he is baffled by some of the more serious problems or even by some of the more common minor ones. Other professions have similar difficulties. Sometimes all the best professional judgment can do is to provide a palliative, recognizing that the condition is one of those for which no cure has yet been discovered.

In the day-to-day situations with pupils and in contacts with colleagues, parents, and neighbors, as well as in dealing with the more serious problems, the teacher's judgment as to what to do or say must be guided by general principles and rise from a thorough understanding of his pro-

fessional field and of his function in the social organization. He will learn to respond professionally, not personally and emotionally, and what he says to a pupil will come to be a part of a plan to help that particular pupil in his development toward satisfactory adjustment, competence, and self-sufficiency.

5. Educational Psychology and Individual Objectives

The Dual Task in Teacher Preparation. The prospective teacher has a double task: (1) he must acquire certain knowledge and skill himself, whether it is in the use of English or mathematics or any other subject, and (2) he must learn to help others increase their knowledge and skill. This double task applies likewise to educational psychology. The knowledge and skill he acquires should contribute to his own adjustment, development, and growth, and it should likewise contribute to the effectiveness of the assistance he is to give his pupils in their life adjustments.

He will wish to use what he learns to improve his own speed of reading, for example, the quality of his thinking, or his competence in human relationships. Such improvement will undoubtedly aid him in his professional work, but this is not enough. He must also be able to develop these capacities in others, so that those whom he is called upon to instruct, no matter what subject he teaches, will improve their own speed of reading, the quality of their thinking, or their competence in human relationships. So the student, to obtain the greatest advantage, will have two questions always before him: How can I use this to my own advantage? and How can I use it in teaching in order to develop the capacities of others?

Personal Objectives. Apart from all professional considerations, educational psychology, like any other academic discipline, can contribute to a general education. Just as one may wish to know about the varied aspects of the world in which he lives, about the world of animal or plant life, of rocks and of land masses, of literature or philosophic thought, for the satisfaction such knowledge brings, so he may well enjoy a greater familiarity with the nature of individual development in human relationships. As a citizen, he may well find that such experience is helpful in enabling him to understand what the schools are trying to do, and to criticize and support their activities intelligently. And, as parents, those who have studied educational psychology can be expected to understand their children better, to bring them up more intelligently, and to create a more satisfactory home environment for them.

Vocational Objectives. There are many occupations besides teaching in which educational psychology is a necessary part of the preparation,

though in these some previous teaching experience is useful and often necessary. One of these is research. In the field of educational measurement there is the tester or psychometrist, who, on the lower levels, understands the techniques of giving tests, and, if more fully qualified, knows what tests to give and how they are to be interpreted. There is the statistician, who may start as a clerk, scoring tests, tabulating, and recording, and who, with his mathematical talent, finds that he is successful and happy in constructing standardized tests, manipulating the various statistical measures, making quantitative analyses of the factors involved in complex situations, and interpreting them in relation to the procedures employed. There is the laboratory experimentalist, who is not so much interested in the large numbers of cases necessary in the making of extensive studies, but who prefers to work intensively with a comparatively small number of subjects, using the techniques of the laboratory under carefully controlled conditions.

A second is clinical work. The clinician is the practitioner, whose task it is to study individual cases of maladjustment, and on the basis of interviews and of various tests to diagnose behavior difficulties and to provide treatment that will aid the individual to regain his proper place as an adjusted worker among his fellows.

A third is administration. Problems of policy, finance, and social interpretation, with which the administrator is chiefly concerned, definitely involve psychological relationships. The administrator should have sufficient understanding of research procedures so that he can evaluate the results of the instruction the teachers are furnishing in his school system, and can recommend and carry through such reform measures as may be advisable. If he has supervisory duties, as is the case in all but the largest school systems, the evaluation of instruction and the work of dealing with exceptional children demand familiarity with the learning process and with testing procedures.

Lastly, the teacher can profit from the psychological study of education; for it is the teacher who establishes contact between the mass of educational doctrine and the child; and, if there is failure at this point— be the theories, the experiments, the organization, and the intentions ever so good—the whole structure falls. It is like an expensive machine run by a poor workman, or a great soliloquy spoken by an actor who mumbles his words. The teacher, if anyone, must know the psychology of the child and the adolescent, understand the nature of the learning process, realize the psychological principles that are basic to the different teaching techniques, and coordinate the efforts of the administrator and the research findings so as to be able to cooperate in the mutual effort to lift

the school to its proper level of helpfulness to the pupils and the community.

The Plan of This Book. Ideally, it would be desirable to give the teacher all available knowledge of educational situations and their psychological aspects—both for his professional training and for his general educational background. Practically, it is impossible to present what is known of these various situations in one volume. It is therefore necessary to select what seems to be the most valuable material in order to give a general insight into the nature of the problems with which we are concerned.

A glance at the table of contents will show that this book is divided into four main sections, as follows:

1. *The educational environment* (Chapters II and III). Some of the relationships of pupils and teachers to each other, to the school, and to the community
2. *Adjustment and guidance* (Chapters IV–VI). The nature of individual needs and the means of satisfying them, with some of the more common forms of failure in adjustment, the effect on the school program, and ways of helping pupils to attain a more satisfactory adjustment
3. *Growth and development* (Chapters VII–IX). The time dimension, the growth of the individual physically and mentally, his characteristics at different stages of growth, and the ways of measuring his academic progress
4. *Learning* (Chapters X–XVII). In the first four chapters, the various mental processes involved in different kinds of learning situations; in the last four, their relation to the school subjects and other learning experiences

No exposition of teaching methods and techniques is included, no formula for instructing children in the intricacies of arithmetic or French or of any other subject. However, the principles here discussed, through the conceptual framework they provide, form the basis of method since they contribute to a better understanding of the pupils who are to be taught and of the processes involved in learning.

In Summary

A kind of airplane view of educational psychology has been provided in order to show the "lay of the land." It may be described as included within the overlapping areas of education and psychology, or as the

psychological aspects of educational situations. The latter are to be found primarily in schools of different kinds but more broadly in all environments controlled or regulated to a greater or lesser extent for purposes of human development. Psychology, including social psychology, is viewed not only structurally as subject matter, but also functionally as research techniques and professional services. More specifically, educational psychology deals with the processes of modifying individual and group interaction, the chief agency for which is a professionalized teaching group, well informed, familiar with scientific and professional techniques, and competent to bring judgment to bear in meeting educational problems. The psychological training involved in preparing for the teaching profession satisfies not only vocational but also general educational objectives.

Questions

1. In what ways do any of the special schools you may have attended or visited differ from the regular public schools? In what ways are they alike?
2. In an educational situation, who controls the environment? How?
3. How does the work of the professional psychologist differ from that of the psychiatrist? psychometrist? psychiatric social worker? social case worker? visiting teacher? guidance worker?
4. Differentiate the fields of physiology, psychology, social psychology, and sociology. Is there any sharp line of demarcation?
5. What are the major divisions of the field of educational psychology? How is educational psychology defined?
6. Show how underemphasis of one of the attributes of a profession weakens the professional worker. How does a skilled trade differ from a profession?
7. Indicate ways in which a knowledge of educational psychology may be of value to the college student; the parent; the preacher; the foreman.

Readings

Bowden, A. O., and I. R. Melbo. *Social Psychology of Education.* New York: McGraw-Hill, 1937.

Britt, S. H. *Social Psychology of Modern Life.* New York: Farrar and Rinehart, 1941.

Beaumont, Henry, and F. G. Macomber. *Psychological Factors in Education.* New York: McGraw-Hill, 1949.

Crow, L. D., and Alice Crow. *Educational Psychology*. New York: American Book Co., 1948.

Cruze, W. W. *Educational Psychology*. New York: Ronald Press, 1942; third printing 1947.

Davis, R. A. *Educational Psychology*. New York: McGraw-Hill, 1948.

Gates, A. I., and others. *Educational Psychology* (3rd ed.). New York: Macmillan, 1948.

Hughes, A. G. *Learning and Teaching; an Introduction to Psychology and Education* (2nd ed.). New York: Longmans, Green, 1947.

Kelly, W. A. *Educational Psychology* (3rd ed.). Milwaukee: Bruce, 1947.

Peterson, H. A., S. S. Marzolf, and Nancy Bayley. *Educational Psychology*. New York: Macmillan, 1948.

Simpson, R. G. *Fundamentals of Educational Psychology*. New York: Lippincott, 1949.

Skinner, C. E. (Ed.) *Educational Psychology*. New York: Prentice-Hall, 1946.

Skinner, C. E. (Ed.) *Elementary Educational Psychology*. New York: Prentice-Hall, 1945.

Sorenson, Herbert. *Psychology in Education* (2nd ed.). New York: McGraw-Hill, 1948.

Stroud, J. B. *Educational Psychology*. New York: Longmans, Green, 1946.

Witherington, H. C. *Educational Psychology*. Boston: Ginn, 1946.

Woodruff, A. D. *The Psychology of Teaching*. New York: Longmans, Green, 1946.

The first two references reveal the scope of social psychology. The remainder are some of the educational psychology texts published since 1945. The tables of contents and first chapters show differences in the treatment of this subject matter.

The Educational Environment

Everyone knows that the job of the teacher is to teach. But such a statement is deceptive because it is so oversimplified. Even the specific instructional duties of a teacher are restricted or facilitated by the nature of the social atmosphere in which he works, and his success or failure often depends less on his work in the classroom than it does on his relationships with people outside. If we put it the other way around, we can say that the nature of the social organization affects the activities of the people in it. It is therefore important to consider some of the wider social relationships within which a teacher works, for to be adequate to his task he must function effectively as a part of the larger social groupings. Various personal and behavioral characteristics are recognized as contributing to successful functioning. These will be considered first; then the various professional relationships of the teacher will be indicated.

But the children of the community, too, are influenced by the environment in which they grow up and in which they are taught. There are large sections of this environment which are not under the control of the school at all, but which the teacher must understand if he is to deal effectively with the children in school. Other parts of it, particularly the school plant and school organization, are important factors in the controlled environment to which reference has been made in the introductory chapter. These can be arranged and organized so as to facilitate learning. So much emphasis in the past has been placed on words as media of instruction that people are inclined to neglect these other important stimuli that have so much effect on the ways in which children grow and develop, and on the kind of people they turn out to be.

The Teacher's Adjustment to the School Community

The mathematics teacher in a small city high school has resigned to accept a position which offers a larger salary and wider professional opportunity. The members of the school board have met to appoint his successor. They have the credentials of a number of candidates, the most promising of whom have been interviewed. In discussing their qualifications with the board, the superintendent suggested that they consider each candidate in two ways: first, what the record shows about his intelligence, scholarship, and teaching ability; and, secondly, how he would probably fit into the school and community life.

The superintendent stated that this suggestion was prompted by the recollection of several unfortunate events that had occurred in his experience. He recalled one young man of good family with an excellent academic record who accepted a position in a small town which, however, couldn't take him seriously because, contrary to the usage in that locality, he wore spats and carried a cane. Another teacher refused to take part in the community life and left town every week-end. A third, who couldn't forget her college record, felt superior to the town where she was earning a living and made the mistake of snubbing the wife of one of the board members. Another was too good a friend of some of the older boys, traveled with a questionable group, and was distinctly a bad influence. Every school administrator can cite many such cases of persons he has "had to let go"—that pedagogical euphemism for "fired for incompetence," not because their scholarship or training was inadequate, but because they were social misfits. They did not adjust to the school community.

The school community is the pattern of social interrelationships cen-

tering around the school. It includes the employees of the board of education and the pupils, but it also includes all others in their functional contacts with the school organization. A man may be a factory worker, but as a taxpayer and parent he is a part of the school community.

What is the nature of the school community in which the teacher must learn to live? What is the structure of the social and professional relationships in which he has a part? What are the qualifications that he should possess if he is to adjust and function adequately in the school community? These are the questions which this chapter seeks to answer.

1. THE INDIVIDUAL AND THE GROUP

The Social Environment. Everyone has become the kind of person he is by responding, in ways that have become habitual, to the situations with which he has been familiar. His ways of responding have been acquired from the people among whom he has grown up, and upon whom he was at first dependent. From them, on the basis of his own inherited nature, he has learned his way of speaking and of dressing, his eating habits, his ways of amusing himself, his attitudes, and his ideas. As a result he is a part of the structure of his social environment. And when he moves to a different community, he carries this familiar environment with him in his speech and appearance, in his behavior and conduct. His habitual ways may or may not be effectual in satisfying his needs in his new environment, and he may be an unhappy misfit until he has learned other ways and has become an effective part of the new community. The process of moving from one social structure to another is called *social locomotion*, or *social migration*, and can be conveniently illustrated in the life of a college student.

The Student's World. The two major groups with which a college student is more or less closely bound may be designated as *familial* and *collegiate*, with most of his demands and satisfactions supplied by one or the other of the two institutions—the family, from which the student is gradually breaking away, and the college, with which he has become temporarily affiliated. Besides these two, there may be other groups, such as the economic, if he is earning a part of his expenses, and the social and recreational, if these are separate from the society of his family or his college. The whole pattern may be diagramed as in Figure 1.

The overlapping of circles represents the fact that the student is a member of these several groups. He is one of the members of his family and of his home community, and is ruled in large measure by their customs and influence. Their funds support him in some measure, their institutions are responsible for him, and their regulations guide or gall

him. His life is likewise ordered by the rules of the college, by the demands of his instructors, and the expectations of his friends. In his new environment, the paternal and communal requirements become less numerous and less explicit. But, as at home, the winds are somewhat tempered, and mistakes are condoned which his employer, if he had one, would not put up with. He is perhaps freer to choose his companions and his amusements than formerly, though the ones outside the provision the college makes for him occupy a relatively small place. Like other adolescents, his position is that of the so-called *marginal* man, for he has moved out of one group, a group characterized by immaturity and dependence, from which, however, he is not entirely free; and yet he is not fully accepted by the other, the adult group to which he will eventually belong.

In the student world, knowledge, broadly interpreted, is ostensibly the *goal*—knowledge to be found in books, discussions, lectures, laboratories and shops, and in the companionship of friends. A considerable portion of the student's time is really devoted

Civic and State

Home, Community

Family

Economic Employing Organization

The Student

Social, Recreational

Class, Friends

Regulations, Courses
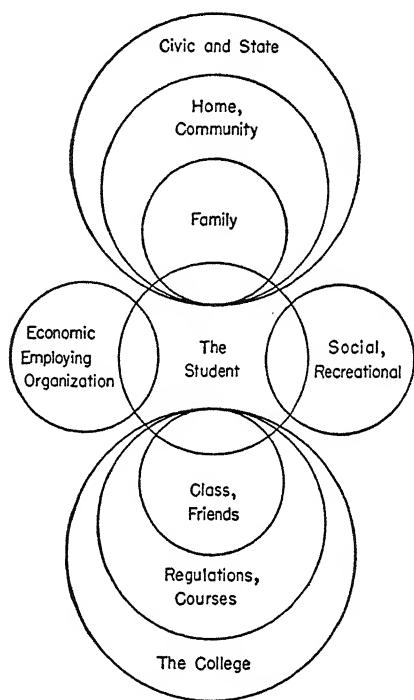
The College

Figure 1. The Student's Relationship to Social Groups

to study, collegiate motion picture films to the contrary notwithstanding, and this study is under the *direction* of his instructors. They may inspire or bore him but he follows or evades their directions, as he will, for he is primarily *responsible* to himself. What he does or does not do, generally speaking, is his own choice, though the college may take steps to avoid any undesirable publicity, and his family may encourage him to make his stay as profitable as may be. His *status*, in the rôle of student, depends on his own efforts, largely on his success in certain college activities, the agreeableness of his gradually maturing personality, the crowd he goes around with, his financial standing, and to some degree on his academic record, at least so far as the faculty is concerned.

The Teacher's World. After graduation, however, the structure suddenly changes. He has largely been weaned away from home, although he is bound to it by ties of affection and responsibility. The formerly small economic and social spheres have enlarged, while the collegiate has magically shrunk to a round-robin letter, an occasional reunion, and the periodic requests for funds from the office of the alumni secretary. His new world, if he finds himself without employment, will be a dangerous, uncoordinated series of shifting forces against which it will be
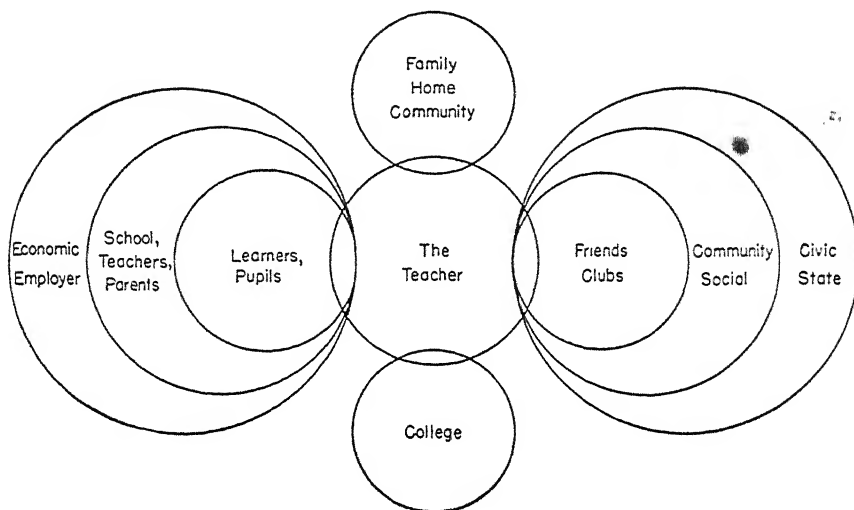
Figure 2. The Teacher's Relationship to Social Groups

difficult indeed to navigate unless he regressively flies back to the paternal (or maternal) nest for security and comfort. If the girl graduate marries, she finds a new regulative system in the maintenance of a home, in her husband's, or perhaps her own, work schedule, and in the life of the community. If the graduate, man or woman, finds employment as a teacher, his situation has altered so that it resembles Figure 2. Now he is still a marginal man, not standing with others in the collegiate boundary area between childhood and adulthood, but alone. He is now a citizen, a member of an adult community, but not accepted until he proves himself. He is theoretically as free as other members to become a part of those groups and activities in which he may find satisfaction.

As a teacher, he is also a member of an organization and is regulated by it. He is, so to speak, "a cog in a wheel." The school system is, of course, not separate from the community, as the diagram implies; but

to the teacher it is a world somewhat apart, with its own demands and opportunities. It is a world which appears first as made up of school-rooms and faculty meetings, of administrative and supervisory officers, of regulations, of classes of children who gradually become individualized, and of some of their parents—usually the more obstreperous ones. Though his main responsibility is in assisting the pupils to learn, he oversimplifies his task if he sees it merely as an instructional job. His knowledge and teaching skill will function adequately only if he himself is an adequately functioning member of the community of which he is a part.

In contrast with the student's world, the *goal* in the teacher's world is not knowledge but effective action. Knowledge becomes an instrument, and a necessary one, but the teacher is judged not so much by what he knows as by what he does. His work is under the *direction* of an employer whose demands are apt to be more exacting than those of his college instructors. He is no longer *responsible* to himself alone, but to his employer, and through him to the institution, and to the people of the community. His *status* in the rôle of teacher depends primarily upon his competence. And, while the skills which served him well in college may be of some value, he must establish himself anew, this time in an adult world.

2. Teacher Relationships

Structure of Professional Life. Apart from the relationships of the teacher to the general community, there are a number of other relationships which are important in his professional life. If these latter are satisfactory, his work is more effective and his life more enjoyable; if they are not satisfactory, difficulties arise, and the teacher is sometimes at a loss to know what the trouble is. The professional structure of which the teacher is a part may be diagramed as in Figure 3. All of these parts are related to each other, but only the teacher's relationships with them will be here considered.

Administration. The teacher's immediate superior is the department head, though in smaller schools the functions of the department head, the supervisor, the principal, and the superintendent may be performed by one or two persons. On the instructional side, the work of any one teacher is necessarily a part of the larger plan of the school for which those in the higher administrative brackets are responsible. Conflicts sometimes arise when the plans of individual teachers do not seem to fit into the larger plan. Such conflicts can usually be avoided if proposed innovations or suggested modifications of school policies are worked out beforehand

and understood by all concerned. This may seem unnecessary especially to the beginner, but any deviation from the usual routine is likely to have repercussions not only among faculty members, but also sometimes among parents and other citizens; the superior officer is not placed at a disadvantage when inquiries and complaints come in if he already knows
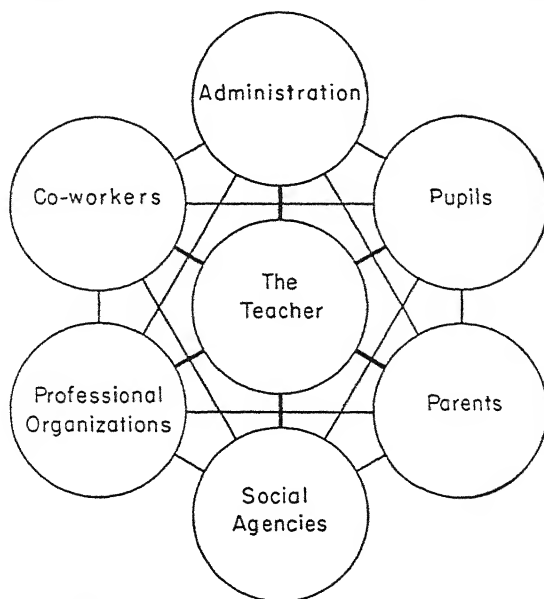
Figure 3.   The Teacher's Professional Relationships

about and has approved what is going on. Schools differ in the amount of assistance they give to beginning teachers. Some let them sink or swim; others provide detailed supervisory direction and oversight. The teacher is expected to seek and accept advice from the supervisor, who, as a rule, has had more experience in teaching than the newcomer, and is better acquainted with the pupils, the school, and the community, and whose function is to continue, for the beginner, the training already begun in the teacher-training institution.

On the administrative side, direction of the school is in the hands of the principal and superintendent, the amount of personal direction given by the latter depending on the size of the system. These officers are responsible for the organization and structure of the school, whether it is autocratic or democratic, whether the program is traditional and formal, or progressive and flexible, and whether troublesome cases are dealt with as disciplinary or as guidance problems. Furthermore, the administrator

is the liaison officer, the adjudicator in those matters of dispute between pupils, pupils and teachers, and between teachers, when the difficulties cannot be handled by the pupils and teachers themselves. Naturally, a teacher who cannot take care of his own difficulties without constantly sending pupils to "the office," or threatening to do so, is not judged to be very effective, though it is often expected that teachers will talk over problem cases with the supervisor or principal.

The superintendent is the executive officer of the board of education, for the schools are community services paid for and supported by the people, a fact which teachers are sometimes apt to forget. The community makes its desires known through the board whose meetings are usually public. Its direction and control lie primarily in its determination of policy and finance, recommendations being made by the superintendent to the board, which has the power to accept or reject them. So it may be that conditions in the school system to which a teacher might take exception are likewise contrary to the wishes of the superintendent; but, temporarily at least, he may be powerless to effect a change because of the attitude of the community as expressed by the board. Hence the teacher, whose contacts with the board may be slight, is nevertheless in countless ways directed and controlled by its decisions.

The nature of the relationships of teachers to administration differs according to the extent of teacher participation in administrative functions. A rough scale might be drawn up ranging from the items which are less to those which are more exclusively the function of administration. The items on such a scale might include: (1) the policies and practices in the testing program, (2) curriculum construction, (3) the marking system, (4) discipline, (5) size of classes, (6) guidance and counseling, (7) rating scales for teachers, (8) the salary schedule, (9) supervision of instruction, and (10) the school budget. It would generally be agreed that teachers should participate more fully in the items at the lower end of this scale and less fully in those at the upper end. The extent to which teachers and administrators cooperate both in developing the program and in the final decision can be viewed as the degree to which democratic procedures are being employed.

Co-Workers. Some of the beginning teacher's most pleasant contacts, and also some of his more unpleasant experiences, are to be found with his co-workers. Older and more experienced teachers as a rule expect a certain amount of deference and usually deserve it. Furthermore, they expect that new teachers will relieve them of some of the less pleasant routine tasks. It is possible that there will be petty jealousies, particularly

on the part of the less competent, older teachers, who may be quick to resent any favors and successes attained by newcomers.

The professional and social contacts of a teaching staff may be unpleasant, or they may be helpful and inspiring, depending in large measure on the effectiveness of the superintendent in maintaining the *morale* of the teaching staff. So far as the responsibility of the administration is concerned, morale is in a large measure dependent upon the following factors: (1) a selection of staff members based in part on their congeniality and their capacity for individual and social adjustment, (2) salary and living conditions, (3) teaching load, (4) condition of plant and equipment, (5) opportunities for advancement, (6) freedom and opportunity to participate in a constructive program, (7) felt interest of the administration in the welfare of the staff, (8) confidence and respect of the staff for the administration.

From the viewpoint of the responsibility of the teaching staff, maintaining morale depends largely upon the following: (1) physical and mental health, (2) the effort put forth by each member to increase his competence, (3) his recognition of the opportunities for work which does not infringe on the spheres of activity of others, (4) refraining from malicious gossip about, or criticism of, colleagues, (5) appreciation of the relation of individual tasks and difficulties to larger school problems, (6) the discovery of ways in which desirable social change may be brought about, though they may be slower than more impulsive individuals could wish, and (7) willingness to do one's part, and at times more than one's part, in carrying on the work of the school. Some of these items might be classified under the somewhat general term, loyalty to the school, and some are also included in one or another of the various codes of professional ethics.

Mention should likewise be made of the teacher's relationship with the noninstructional employees—cafeteria workers, office assistants, janitors and custodians—who, though they are employed for nonteaching services, nevertheless have no little educational influence upon the pupil group. Particularly important in many places is the political influence of the janitors or other custodians, for they have usually been about for many years and have seen teachers and superintendents come and go. They even sometimes help them go, to pay off some real or fancied slight, since they may be connected by friendships or by blood ties with persons influential in the local government.

Pupils. The teacher's relationships with the pupils are far more complex than is at first supposed. Besides his narrow instructional rôle, the

teacher finds himself "in loco parentis," their guide, counselor, and friend. Specifically, his functions are *directional* and *advisory*. In some situations, the pupil is expected to do what he is told without question; in others, the teacher may advise and allow room for choice. But, whatever the rôle of the teacher may be, his direction and advice will be more effective if he has *prestige* with the pupil group. Prestige is defined as ascendancy derived from general admiration or esteem. If a teacher is liked, and can do well what pupils desire to do or what they think is important, he will have prestige with the group. The merest suggestions of the teacher with prestige are carried out with an alacrity for which another teacher will look in vain. Some of the complexities of these relationships are considered in more detail later.

Parents. The teacher's relationship to parents is chiefly twofold—through individual conferences and through the parent-teacher association. The teacher may be regarded as a high-class nursemaid by some parents, and as an important functionary by others. The teacher may at times feel that his judgment is better than that of the parent as to what is the matter with a child and what should be done about it. But the parent has lived with the child for a longer time and is the one who is responsible for him. In a proper sense, the teacher is "retained," like a lawyer or a physician, for the professional services he is trained to render. It is therefore his task to explain the nature of his work to the parent if questions are asked, to explain the kind of progress the pupil is making, to listen to symptoms, and, if asked, to offer professional advice. That some parents become exasperating to teachers at times is true, just as some patients are trying to a physician who has rendered all the help that medical knowledge can provide. But the teacher's job, like the physician's, is professional cooperation.

This cooperation is often promoted through the parent-teacher association. The importance of the meetings varies according to the parental support which is available. It nevertheless provides pleasant social surroundings where parents and teachers may become acquainted, where individuals may "blow off steam" and perhaps be answered by other parents (making it unnecessary for the teacher to withstand the brunt of the attack), and where they can be informed concerning the policies and practices of the school by members of the staff.

Educational and Social Agencies. It is not always realized that the school and the home are not the only social groups which are concerned with the welfare of children. A pupil may also be under the more or less tenuous direction of the Sunday School, the Boy Scouts, and a com-

munity welfare organization, to say nothing of the juvenile court. Obviously, these agencies should not be working at cross purposes, as sometimes happens. The advice of the scout master, the minister, the teacher, and the social worker should reveal some degree of unity. Frequently, cases are written up in detail in the files of one or another welfare agency, and the Social Service Exchange, even in smaller cities, has listed in its confidential file the names of the agencies to which all cases have been referred, which information is available to qualified persons. If the teacher knows something of the work of the other educational and social agencies concerned with the problems of youth in the community, and knows something of the personnel of those agencies, and their contribution to a particular case, it is obvious that the handling of that case will be more intelligent than it could otherwise be.

Professional Organizations. The teacher is usually a member of at least one professional organization, such as a state education association or the National Education Association, the organization of elementary school teachers, or of teachers of a certain subject matter. The various educational journals keep the teacher in touch with what his colleagues in other places are doing and the scientific work that is being carried on, and the usual annual meetings provide the opportunity for him to hear and talk with the leaders of the profession. He is thus not isolated but becomes one of a larger group of people who are confronted by the same difficulties, and who are solving or attempting to solve the same problems. It would be expected that the teacher will take part in these meetings and make contributions from time to time to the journals. In doing so, he is contributing to the development of the group and also to his own professional growth.

3. THE TEACHER'S QUALIFICATIONS

Judging the Qualities of Good and Poor Teachers. In view of the complex social organization of the school community, what qualities should teachers have to adjust to its varying demands? Can one assess his own qualifications, and modify his social behavior in certain ways so that as a consequence he will find his rôle as a teacher more satisfying, and be more successful in his work than he otherwise would have been?

Some of the qualities of successful teachers are primarily innate characteristics, such as intelligence and certain temperamental traits. Some are developed through the regular training program, if those in training are alert to the possibilities. And some may be developed by the individual himself if he realizes the need for them in time.

When a superintendent interviews a candidate, he is admittedly view-

ing him against the background of his own personal experience compounded of wisdom and prejudice. But he is trying to do something very difficult. He is trying to look at the candidate through the eyes of his school community. Personally, he may favor or object to certain characteristics, but, as already indicated, his task is to find someone who will fit into his organization, and into the city or town of which it is a part, in such a way that the relationship will be amicable, and, if possible, advantageous to all concerned. Let us glance at the negative side first.

A teacher who has permanent tenure may be legally dismissed for incompetence, immorality, insubordination, and neglect of duty; but these are rather vague terms and require courts of law to interpret them, as does the still more vague legal phrase, "for good and sufficient cause." But causes of failure are many, and often what seems to be the cause is in reality a symptom of some more fundamental conditions. For example, "incompetence" in the form of lack of discipline may be due to lack of command of educational method, a bad voice, poor health, or inadequate supervision; "immorality" may be the result of a glandular condition, a poor home background, or repressive regulations; and insubordination, while it suggests the possibility of weak school administration, may have derived from faulty training.

Judgments of the qualities of good and poor teachers come chiefly (1) from teacher-training institutions, (2) from school superintendents and supervisory officers, and (3) from the pupils taught.

1. As an example of the view of the *teacher-training institution* an analysis may be cited of forty articles and reports dealing with the pre-training selection of teachers which concludes in part as follows:

The traits and qualities most frequently considered are: scholarship, teaching aptitude, academic intelligence, social intelligence, skill in expression, health and physical fitness, freedom from physical defects such as unsightly deformities, poor vision, defective hearing, and marked over- and under-weight, character, personal fitness, personality, social attitudes, emotional stability, and freedom from neurotic tendencies.[1]

However, these general characteristics are not revealed in any one test or in any one action. It takes a careful study of many tests and of action over a considerable period to determine the presence or absence of many of these characteristics.

Rating scales used by colleges of education likewise reveal the qualities considered important in teaching. These scales usually emphasize personality, general preparation, professional attitudes, teaching qualities,

[1] R. H. Eliassen, "Pre-training Selection of Teachers during 1934–36," *Educational Administration and Supervision*, vol. 23 (May, 1937), 367–376.

classroom management, results of teaching, and extra-classroom activities, with a number of subpoints under each. Similar qualifications for admission to training have been recommended:

At the beginning of any period of professional specialization in any institution for the education of teachers, requirements should be set up that will eliminate all candidates who have not shown in their previous educational record definite scholastic interests and aptitudes, the possession of effective habits of study, satisfactory personal traits, adequate physical vitality, satisfactory emotional control, a socialized attitude, freedom from all serious physical and speech defects, and the possession of strong professional interests.[2]

2. *Superintendents and supervisory officers* tend to look on the negative side. Causes of failure are listed as follows:[3] weak personality, lack of teaching skill, lack of interest in teaching, laziness, failure to cooperate, and poor health. In forty interviews with superintendents, forty-five causes for dismissal were mentioned, the most frequently occurring of which were the following: poor discipline, inability to cooperate, gossip, sexual immorality, lack of teaching skill, disloyalty, inability to adapt oneself to a situation, unwise choice of social companions, lack of desire for professional growth, irresponsibility, and a critical attitude toward colleagues.

Difficulties encountered by beginning teachers as reported by 183 experienced superintendents have been classified under three heads.[4] The chief difficulties found in relations with pupils outside the classroom were: being too friendly with pupils, inability to win friendship with pupils, and engaging in too many activities with pupils. Among the difficulties encountered in relations with other members of the staff the following were prominent: failure to recognize the need for cooperation, timidity, conceit and overconfidence, aloofness and self-sufficiency, inability to treat school matters as confidential, and jealousy. Some of the more frequently recurring difficulties encountered in community relations were: lack of social adjustment, lack of interest in community activities, failure to consider community customs and opinions, and inability to adapt to community modes of thought and living.

[2] F. E. Baker, "Selective Admission and Promotion," in *The Education of Teachers* (*Twenty-third Yearbook of the National Society of College Teachers of Education,* 1935), pp. 16–72.

[3] R. H. Morrison, "Factors Causing Failure in Teaching," *Journal of Educational Research,* vol. 16 (September, 1927), 98–105.

[4] J. G. Umstattd and P. O. Johnson, "Difficulties Encountered by Beginning Teachers," *School Executives Magazine,* vol. 52 (August, 1933), 404–405.

From the point of view of the employer, such personality traits as the following are considered desirable: promptness, orderliness, courtesy, tact, poise, trustworthiness, loyalty, and cooperation.

Some schools are anxious to find teachers who give promise of developing another set of characteristics which may be called originality, initiative, and leadership—in other words, the ability to think of new ideas and methods, get them started, and get others to participate in carrying them forward. On the other hand, there are schools run on a deadly routine which look with disfavor on any innovation, and consider any teacher a trouble-maker who wishes to deviate from the hallowed path of custom.

3. The *views of pupils* on teacher qualifications have likewise been sought. However, there are many arguments both for and against the student rating of teachers. In general, it may be said that, while pupil judgments are immature, they are often penetrating and sagacious. In all fairness, therefore, it would seem that the pupils should be heard.

The pupils in one high school were asked to list the qualities which in their judgment made good teachers.[5] The most frequently listed qualities which made good teachers, in the opinion of these pupils—and the selections are typical—were the following: good disposition (kindness, patience, cheerfulness, control of temper), impartiality, ability to explain clearly, discipline, knowledge of subject, fairness in marking, sense of humor, helpfulness to pupils outside of class, understanding of high-school boys and girls, knowledge of how to interest pupils, honesty in all dealings, good judgment, good personality, school spirit, and the ability to give clear and definite assignments. Some of the characteristics of poor teachers which are not merely the opposite of the qualities listed above were: talks too much, nags pupils, too strict, fault-finding, does not take care of own discipline problems, poor English, poor voice, always preaches about something, calls attention to the difference between bright and dull pupils, thinks poor marks make a pupil study, always brings up past errors.

For the teacher, that degree of self-knowledge may not yet have been acquired which would enable him to say rightly whether he himself possesses these characteristics in the eyes of the children or not. He who thinks he is fair and just may be outraging the sensibilities of his pupils; he who thinks he is sympathetic may be making them smart with embarrassment; he who considers his self-control masterful and his patience saintly may be as touchy as a wet hen; and so it goes. The child's world

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[5] U. L. Light, "High School Pupils Rate Their Teachers," *School Review*, vol. 38 (January, 1930), 28–32.

is not the adult's world, and those who "have a way with" children and young people have their path smoothed before them.

All these and many other qualities might be investigated, including age, sex, and religious affiliation, which are often factors in teacher selection, though, with the possible exception of the last, they are not modifiable. For purposes of discussion, the following general qualifications which often recur in such studies as those reported and on teacher rating scales will be considered in some detail: moral character, health and physical energy, intelligence, scholarship, appearance, language usage, and "personality."

4. General Qualifications

Moral Character. The demands of a community with respect to the moral character of its teachers often seem exacting and sometimes ridiculous. Such matters as smoking, the use of make-up, and the like, which in some communities are not a matter of morals at all, in others take on a sinister significance. A routine formal party in one region is the "high life" which leads to ruin in another. Such changes are disconcerting to anyone whose social locomotion brings him across the line, in whichever direction it is that he has moved. The transition to a less liberal code is apt to be the more common one for teachers, who may therefore become irked not so much by this as by the fact that the demands made upon them are more stringent than those made upon other members of the community.

There are various reasons for this condition, one of which is historical. Schools have long been connected with the church, and in the earlier days in this country the tasks of preacher and schoolmaster were often combined in one person. It is but natural that the process of secularization is not complete, and that some of the sanctity surrounding the clergy should adhere to the lay orders. Both have been and still are expected to stand for the better things in the community, and one can understand why parents want their children to be under the best possible influence, better even than their own.

To many people, immorality means sexual irregularity, which, when it finds its way into a teaching staff, causes untold difficulties not only for those concerned but also for the school as a whole in loss of prestige and in a sharp decline in the value of the educational service it can render.

Conditions of more frequent concern, however, are those regulating social conduct. Teachers have signed and still sign contracts in which they promise that they will not use tobacco or alcohol, will not dance, and will not have dates with high-school pupils. One can sympathize with school board members who may have had the unpleasant experi-

ence of getting rid of a boy- or girl-crazy teacher for taking steps to avoid that kind of trouble. Likewise, it is understandable that they do not wish to have the smooth running of the school interrupted by the activities of teachers who are careless of their responsibilities in the use of money or who are sufficiently "radical" to get unfavorable publicity for the school.

In these areas of social conflict, a single teacher, who is a stranger in the community and is young, cannot hope to overthrow the entrenched forces of mingled reason and prejudice. Even if such regulations produce a feeling of frustration, the teacher will have to learn to adjust to them, except as he can ally himself with influential individuals and groups who will support a gradual modification of some of the restrictions.

More amazing than the negative restrictions, to many teachers, are the positive demands—the expectations that they will participate in social work, sing in the choir, teach a Sunday School class, or run the Boy or Girl Scout organization. It is argued that, so far as young people's work is concerned, five days a week is enough, and perhaps it is. On the other hand, there are advantages to be gained by the teacher in knowing the children and their backgrounds a little better and from a different angle. The school and the community likewise should gain from such participation, and certainly, in a democracy, it is important that those who can do so should assume some responsibility in the work for the common good.

In a larger sense, moral character means more than absence of immorality, conduct in conformity with local customs, and participation in community efforts at betterment. It also means conduct which is in accord with the ethics of the profession. Some professions, notably the legal and medical, have fairly well-defined ethical codes to which the practitioners subscribe, and which the more responsible members follow. The many codes which have been drawn up for the teaching profession emphasize proper social and financial relationships with pupils, loyalty to and support of other teachers, the desirability of professional growth, and honorable relationships with advertisers and teachers' agencies. While there is some malicious malpractice in these areas which no ethical code will be effective in eliminating, there is also a danger that a beginning teacher will perhaps not recognize the full significance of such conduct until he has laid himself open to the charge of sharp practice or of stupidity, neither of which is helpful to his own reputation or to that of the school.

Physical and Mental Health. Second only to "a good moral character" is the demand of the superintendent that the teacher possess good health

and strong physical energy. Teaching is an exacting job, and no school system wants to support a ward full of invalids. Sick leaves are expensive, the ailing teacher loses in effectiveness and prestige and may even become a dangerous source of infection. Those whose health is not good will do well not to place themselves in a situation in which they must be "on their toes" from eight o'clock in the morning until four or five at night, and which often makes demands upon the evening hours. Those who are preparing to teach will be wise to have a thorough physical examination and have any defects corrected, such, for example, as conditions of focal infection in teeth or tonsils. And beginning teachers will be wise to set up an intelligent health regimen which will enable them to carry through their daily program with zest and enjoyment. They are no longer where parents can make suggestions and demands, or where dormitory regulations, a dean of students, and a health service will look out for them. If they lose sleep, they can't skip one class and doze through the next!

Mental health is quite as important as physical health for teacher efficiency and happiness. Psychiatrists have sometimes made the mistake of recommending that certain of their mildly neurotic patients teach school for the advantage to them of being responsible for children. But the schools are not institutions for the care of neurotic adults. Children taught by certain types of neurotic teachers have been found to have more neurotic symptoms than those taught by normal teachers. It is therefore important that teachers be carefully chosen, and that those who are chosen maintain their mental health. Some of the decisions which teachers may face have already been mentioned in connection with community demands. Others, perhaps more fundamental, are to be found in *levels of aspiration* higher than the individual's ability or financial status permits him to achieve.

Causes of frustration, especially for beginning teachers, have been outlined as follows:[6]

1. Personal difficulties intensified by the nature of professional life: (*a*) difficulties characteristic of the early twenties; (*b*) more lasting temperamental difficulties.

2. The placing of teachers, at the beginning of their careers: (*a*) in departments for which they have not trained; or (*b*) where there is insufficient scope for specialization or for the development of individual interests.

3. Difficult conditions of work: inadequate buildings and equipment; two or more classes in one room, etc.

[6] M. Phillips, "Some Problems of Adjustment in the Early Years of a Teacher's Life," *British Journal of Educational Psychology*, vol. 2 (November, 1932), 237-256.

4. Problems of (*a*) class management; and (*b*) the treatment of difficult individuals.

5. The attitude of head teachers, and of older members of staff, to young teachers.

6. The apparent difference in outlook between one generation and another, especially as regards (*a*) disciplinary methods; (*b*) educational aims and values.

7. Difficulties arising out of the social background of the school—poverty, the opposition of parents, etc.

8. Insufficient leisure during the early years of teaching life.

9. Financial difficulties during the early years of teaching life.

In spite of all these possibilities for frustration and the danger of contagion from what have been called occupational diseases of the profession, it is doubtful that a larger proportion of teachers are "queer," or psychopathic, than of any social or professional group. To be no worse, however, is not good enough. For teachers are in a position of social responsibility, and hence the neurotic among them become a menace to the school children and to the community.

The effects of frustration are discussed in Chapter VI. Suffice it to say here that an effort to meet problems on a rational rather than on an emotional basis is well worth making. In addition, one or two interests outside the school routine, adequate recreation, and the continuation of professional study are helpful devices for maintaining mental health.

Intelligence—General and Social. General intelligence, as measured by intelligence tests, has surprisingly little relationship to teaching ability, particularly in the elementary school. There are two main reasons for this anomaly. One is that most of those who are teaching have sufficient intelligence for their particular job. If idiots and imbeciles were employed, they would obviously be less successful, and so a definite positive relationship would be shown between intelligence and teaching success. Selection in terms of the job naturally occurs in that those who plan to teach in the intellectually more exacting branches as a rule have the intellectual competence to master these branches more or less adequately, or they would have been eliminated during their course of training. A second reason for the relatively slight relationship between intelligence and teaching success lies in the fact that other personal characteristics are of so great importance in teaching. A less intelligent person who knows the difficulties of a subject from bitter experience, who loves to teach and loves children, for example, will probably be more successful than a more intelligent person who mastered the subject without difficulty, who hates teaching and dislikes children.

However, other things being equal, it is probably safe to say that that teacher will be more competent whose intelligence is higher than that of the majority of his pupils, high enough for him to master more of the subject he is teaching than is in the curriculum, and sufficient to enable him to see the relation of the particulars of daily classroom practice to the generalizations of educational theory.

The concept of social intelligence is still perhaps too vague to be employed here. Broadly speaking, it includes almost everything from appearance and etiquette to personality and character, but it applies more specifically to intelligent judgment with respect to social relationships. The socially unintelligent person is the one who is said to be "always doing stupid things," who, "every time he opens his mouth puts his foot in it," or who in general doesn't know how to "get on well" with other people.

One teacher put adhesive tape over the mouth of a too-talkative girl. Another, in front of the class, said to a child who had been reporting to the clinic for treatment for stammering, "Well, Mary, you've been down to Miss ——'s so you could learn to talk. Stand up and say something. Let's hear how you can talk now." Another told the parent of one troublesome youngster that he was a problem child. It is difficult to imagine a training course that could successfully warn students of education against all the possibilities of saying or doing the wrong thing. One must generalize in terms of courtesy, tact, and respect for the personality of others. In any case, it is unnecessary for the beginner to be socially gauche; he can ask his friends to be frank with him about any social mannerisms he may have, aim to be tactful, and hope for the best.

Scholarship. The attitude of the college population varies widely with respect to the values inherent in scholarly pursuits. For those who are going into selling, into their fathers' businesses, or into matrimony, the value of the social contacts to be made may outweigh that of the knowledge and skill the college traditionally is set up to impart. But for those going into the professions, a college education is vocational training, and there is little danger of becoming too proficient. The fine points and distinctions which his professors elaborate may seem unimportant to the college student. But he is now approaching the point where he will be judged by professional standards. A dental student smiled knowingly at his instructor who was showing him the intricacies involved in the making of a gold inlay. "I'll bet you don't take that much pains in your private practice," he said. The instructor, a little taken back, replied, "If you don't take that much pains, you won't have any private practice!"

Preparation for educational work may be considered in three categories: subject specialization, professional knowledge, and general education. People differ as to how much *knowledge of a subject* an individual must have before he begins teaching its elementary branches. A mature mind can "keep ahead of the class," and there are few teachers who, at one time or another, haven't been forced to make up deficiencies of preparation on the job. Though formal subject matter suffers least under such conditions, the practice is hardly to be commended. Mistakes, misinformation, fumbling, loss of prestige, and general inadequacy of performance are the usual results. Children are inadequately prepared and grow up with little respect for schools or school people. Such conditions belong to a primitive stage of cultural development and are rapidly being superseded.

On the other hand, certain subject-matter specialists maintain that courses must be piled upon courses in the subject of their specialization. They lose sight of the fact that a teacher is usually required to teach a minimum of two or three different subjects, a thorough preparation in all of which would indefinitely extend the preparation for work not now adequately remunerated, and that such specialized training in the subject-matter field might possibly create too great an interest in the subject as such, instead of in the flesh-and-blood boys and girls who are expected to be developed by the experience it provides.

Similar differences of opinion are found with respect to *professional education.* Without entering into the controversy at this time, it would seem reasonable to contend that an educator in the making should study educational psychology and so gain an insight into human nature in general and the nature of the child in particular—his individual and social development, the kinds and extent of the individual differences which are found, and the nature of the learning process. He should know something of the means employed—that is, the curriculum and methods—of the objectives sought, the philosophy embodied in educational institutions, and the historical development of the educational and philosophical ideas in relation to the cultural periods of the past and present. He should likewise have practice in teaching under supervision, and seek to relate the day-to-day experiences of the classroom to the facts and principles he has learned and so develop an intelligent educational philosophy of his own.

And, lastly, it might be expected that the teacher should have what is somewhat vaguely termed a *general education,* that he should know and appreciate some of "the best that has been thought and said" in his own and other cultures, that he should have an interest in what is going

on in the fields of science, art, and government and be an intelligent voter and citizen. An "all-A record" is not an invariable mark of a good teacher, but a good academic record indicates that an individual can handle adequately and well those things which are supposedly the teacher's main stock in trade.

Appearance. The superintendent can depend almost entirely upon records and recommendations for evidence of good moral conduct, health, intelligence, and scholarship. But still he will want to interview the candidate to see what he looks like, hear him talk, and form an impression of his personality. Matters of appearance should be and usually are of less significance than the other characteristics here discussed. But "slouchy" or "flashy" dress or other inappropriate extremes, soiled linen, lack of judgment about make-up, a shifty eye, awkward bearing, or a dead-fish handshake have lost many a job for an otherwise promising candidate, or have circumscribed his usefulness if he succeeded in getting it.

In some jobs, like bookkeeping, accountancy, and laboratory work, personal contacts are relatively few in the course of the day's work. In others, including salesmanship, medicine, secretarial work, and administration, one is constantly in the public eye, and one's usefulness is in part determined by the public's reaction. Teaching is in the second category. It has been said that a teacher has no more privacy than a goldfish; and, while all cannot be equally attractive, nevertheless intelligent effort can be employed to make a favorable rather than an unfavorable impression.

Language Usage. In laying a stone wall, balancing an account, or playing a violin, there is little need for language. But if one is to teach others, language skills are needed. The teacher's *voice,* almost constantly in operation, though theoretically held in check, may be the most useful or the most disagreeable of instruments. Assurance, calm, encouragement, good nature, and kindliness may radiate from it, or it may hiss and rasp and shriek its way through the day until the pupils become nervous or even mutinous. Speech training is in many schools a required part of teacher education. Speech handicaps must be eliminated, enunciation clarified, and voice placement corrected.

A somewhat different problem is that of *spoken language.* The question of what the teacher should say, and when, is one of method, but normal correctness of utterance is a more general matter. Young men and women have been known to finish college with such barbarisms on their tongues as "I hadn't ought to a' done it," and "just between you

and I," and with oral vocabularies exceeded by some of the brighter children. And some who pass for literates in conversation are weak in the ability to use the *written language*, write an infantile or illegible hand, misspell common words, and are quite incapable of writing a brief news item, or an account of the methods they are using, to say nothing of an essay on some topic of current interest, in spite of the "term papers" they have compiled while in college. Words are the teacher's tools; and, while bungling work will often get by, anything approaching leadership in the profession calls for an interest in them and in their use which demands continued study and practice.

Teaching Ability. Obviously, it is important that a teacher be able to teach, and, while the qualifications thus far discussed throw some light on this central function, actual performance before a class remains the most satisfactory single basis for judgment. Judgments of teaching ability are made by critic teachers and supervisors of practice teaching, and their judgments weigh heavily with employing officers, though it is recognized that the situation is an artificial one as compared with work on the job. Probably the most significant aspect of teaching ability is usually referred to as "discipline," defined as maintaining order. No superintendent wants to employ a teacher whose room will be a bedlam, and who has no control over the pupils he is expected to teach.

The word *discipline* has many meanings. Even in the restricted sense of maintaining order, it is a very complex thing, growing out of the structure of the school organization. This is dependent on a number of factors. One is the system of social control in the school, whether it is autocratic or democratic as it operates among the teachers and within the pupil group. A related factor is the school program, whether it is narrow and formal, or more flexible with provisions for pupil differences in interests, aptitudes, and needs. A third factor is the kind of discipline which is expected, the kind in which every pupil must stay in his seat, keep quiet, and speak only when the teacher asks him a question, or the kind in which more initiative and greater freedom of movement and activity in carrying out group projects are expected. The fourth factor is the teacher himself, his leadership qualities and his ability to fit adequately into the structure of the school, of whatever sort it may be.

Whatever the structure of the school organization, some teachers are more successful than others in maintaining discipline. Their success depends on a number of personality factors. For example, a teacher who seems queer to the pupils in matters of dress or speech has an initial handicap to overcome, as does a man who is effeminate or a woman who

is prim or awkward or mannish. A teacher who is tired or in poor health is apt to be annoyed and "make a scene" unnecessarily. Pupils apparently like to take advantage of one who is "easy-going," and to make trouble for one who is overstrict. There are too many possibilities to consider here in detail. No one teacher is confronted with all of them, and individual weaknesses should be overcome during the course of training. If a teacher has shown an early interest in teaching, and if he has a liking for children, and is friendly but yet somewhat reserved, he will probably have little difficulty with discipline, providing the qualifications above discussed are satisfactory. His task will be to direct the activities of pupils, to interest them in their tasks, and to motivate those of widely varying abilities and inspire them all to do their best. He can direct, interest, motivate, and inspire only if he impresses them as being on their side, not against them. If he likes them, he will not "bawl them out" before the class or humiliate them in other ways, he will be interested in what they are interested in, he will help them when they get into difficulties and encourage them in their best efforts.

"Personality." Among the many qualifications teachers are expected to possess is what is usually referred to as personality. There are several different meanings of this term—but it will suffice now to distinguish two. The first meaning includes the total pattern of significant characteristics which serve to distinguish one individual from another. Personality defined in this way is more or less objectively arrived at and is not necessarily referred to any standard of excellence or desirability. It is what it is, dynamic, variable, overt, shut-in, dominating, or anything else, apart from what anyone may think of these characteristics. The second meaning refers to the effect of an individual upon those about him, his "stimulus value," whether he is attractive, repellent, pleasing, or displeasing to others. It may be "good" or "poor" according to the standards by which it is judged.

The second definition is seen to be relative in that the same person who would conceivably have but one personality—namely, his own—might be attractive to some people and repellent to other people, or pleasing in some ways and annoying in others. Hence it is not a scientifically satisfactory definition. And yet it has certain advantages in practice, if the groups the individual affects are fairly well defined. It is possible to consider some of the characteristics and significant ways in which he behaves or is likely to behave and to predict how these ways could affect the people with whom he is likely to come into contact.

5. THE RÔLES OF THE TEACHER

The teacher's adjustment to the school community calls not only for certain personal qualities such as those that have been discussed. In addition, there must be a degree of flexibility in his make-up. In order to provide the regulated environment conducive to pupil learning, he is called upon to do many kinds of things. His varied activities may be conveniently thought of as calling upon him to play a number of different professional rôles. At one time or another he is liaison officer with the people of the community, curriculum planner, activity director, instructor, evaluator, and case worker. Each of these rôles will be briefly considered.

The Teacher as Liaison Officer. The superintendent's office carries the official responsibility for maintaining cordial public relations between the school organization and the community. *Social interpretation* is the name given to this function, the interpretation of the school program to the people of the community who give it their support. However, every teacher has a partial responsibility which manifests itself in three ways. The first is in his conduct as a citizen of the community and in parent contacts. Though it is fallacious to do so, people often judge a cause or an institution by the persons they know who are in it. Thus a teacher who is known and admired by the people of the community brings credit to the school and to the cause of education; one who is obnoxious tends to discredit the whole educational undertaking.

The second phase of teacher responsibility as liaison officer lies in his relationships with his pupils. If the pupils enjoy their work, think the teacher is fair and willing to help them, and so on, as indicated earlier in this chapter, the word goes out, and the school gains public support thereby; whereas if the teacher is incompetent, and at odds with the pupils, this likewise has its influence.

The third phase of the program of social interpretation, the one that most exclusively belongs to the teachers, lies in the reports to parents of the progress their children are making in school. As the traditional competitive, selective view of the American public schools is gradually giving way to that of an environment conducive to learning and growth for all, it would be expected that the system of school marks and reports would undergo a change. The traditional type of report card, which gave the teachers' judgments of success or failure of pupils in meeting rather vague, arbitrary standards of verbal performance, was never a very good public-relations document. Backward pupils were discouraged

and bright pupils often rewarded for work below their best, while parents, often for social, competitive purposes or to satisfy their own false pride, brought undesirable pressure on their offspring to get higher marks.

As a first stage in improving the report card, schools have added a short list of desirable traits on which pupils have been rated. Some schools have gone further and drawn up a longer list of activities to be checked according as pupils are improving satisfactorily or need further help. Another practice is for teachers to write personal letters to parents, and still another to arrange for parent conferences at the school. Sometimes combinations of these procedures are employed. In any case, it is clear that there is a two-way objective: to inform the parents as to the nature of the school program and their child's participation in it, and to create a harmonious relationship between the pupil's home and school environment that he may obtain optimum benefit.

The Teacher as Curriculum Planner. In most modern schools, the teachers are expected to have some voice in the selection of textbooks and in determining what will be taught in particular courses. Some schools slavishly follow a required course of study, and others give the teachers considerable freedom in working out with the pupils programs that seem to satisfy their needs. In any case, careful forethought must be employed to be assured that the activity of the pupils will be of the greatest educational value, whether it be listening, reciting, looking at films, carrying out a project, or going on an excursion.

Much teacher planning is carried on in committees, some schools depending in part for their courses of study on what such committees work out. Efforts to adapt instruction more closely to pupil needs have sometimes led to discounting the value of textbooks. A great deal of care goes into the construction of a textbook, on the part of author and publisher alike. It cannot be dismissed in cavalier fashion in favor of materials hastily assembled with the aid of scissors and paste in the teachers' spare time. However, pupil access to more than one book provides different points of view, and sometimes new and different materials are definitely needed.

The Teacher as Activity Director. The teacher is primarily responsible for the social structure of the classroom. By the arrangement of the furniture and supplies, the apportionment of time to the several pupil activities, the directions given and the manner of giving them, and the kinds of pupil organization developed, he can make the discipline and the atmosphere of the room about what he wants it to be. If the furniture

and supplies are so arranged that numbers of pupils have to climb past each other to get where they need to be, or to procure the books, papers, notebooks, and the like that they need, the situation is apt to get out of hand at once, with the consequence that orders are shouted, punishments inflicted, and general ill-feeling aroused. If these troubles are avoided, the pupils still need to know what they are expected to do. The secret of success lies in planning beforehand, whether the plan is to be put over dictatorially, developed, or modified, or not followed at all as a result of the direction which pupil suggestions and questions may take.

There are various means of control which teachers may employ in their relations with pupils of which a few may be mentioned here. The most unsatisfactory and dangerous is *ridicule*. It may appear as sarcasm, which, with or without an ironical turn, is bitter, taunting, and reproachful, with the intent to wound the feelings, though sensitive pupils sometimes "take personally" remarks which are made with no such intent. It may appear in the form of opprobrious epithets (fool, stupid, "dumbbell") which should be completely outlawed from the teacher's vocabulary. It may appear as laughter, unpleasant and withering if directed against anyone. But laughter may unite a group if in good humor and directed at oneself or at opposing circumstances.

A second and most common method of control is the *command*, or *request*, which can be used effectively only by those with appropriate position or prestige, or the question arises, "Why should I do what you say?" And only such commands should be given as can be obeyed, and can be enforced, or the teacher's position is weakened. The request is usually more effective since the authoritative note, while present, does not obtrude. It may take the form of a suggestion, which, it has been found, is more effective if it is specific and positive, rather than general or negative. "We don't want to be untidy" is less effective than "We pick up the scraps when we are through."

A third method of control is through promise of *reward* or threat of *punishment*. A threat is aimed to produce action through fear of injury or loss of status, and is a distinctly undesirable form of control to employ in school. It has no doubt been inferred that retributive punishment or any administered emotionally, when it becomes bullying and sadism, has no place in the school. Silence and the appearance of acquiescence may result, but smouldering opposition and resentment are produced when the punishment is considered unjust or too severe. A promise is aimed to produce action through the hope of good things to come, such as good marks, commendation, a successful outcome, or greater satisfaction in the future. It may call for a little persuasion, which consists of showing

someone that what he wants may be obtained in the way that is indicated. Ideally, the punishment and the reward grow directly out of the behavior concerned (intrinsic) instead of being brought in artificially (extrinsic). It often happens, however, that desirable behavior is sufficiently rewarded by personal satisfaction or group approval. In some schools, student council committees assume some responsibility for this form of control, though these need to be carefully watched for fear they make the same mistakes a poor teacher might make, acting vindictively, or recommending too severe or unjust punishment, thus weakening their own position without correcting the situation.

The Teacher as Instructor. There is no reason at this time to elaborate the various instructional techniques. It is important, however, to realize the complexity of the social behavior involved in instruction, much more complex than merely lecturing or hearing pupils recite. In one school, which is not presented here as a model, the teacher had the pupils copy the sentences from their textbooks onto the blackboard. At the other extreme is an "activity program" in which the pupils are told they may do anything they want to. The scheme below suggests some of the activities in which teacher and pupil engage.

Teacher and Pupil Activity

A. When the initiative lies with the teacher

Teacher	*Pupil*
1. Talks, tells, explains, reads	Listens
2. Assigns, suggests, corrects	Reads, writes
3. Asks, listens, encourages	Recites, talks, tells
4. Directs, coaches, demonstrates	Obeys, imitates, tries
5. Tests, examines, corrects	Answers, performs

B. When the initiative lies with the pupil

Pupil	*Teacher*
1. Asks	Answers, suggests
2. Proposes, discusses	Participates, directs
3. Questions, criticizes, disagrees	Explains, supplements
4. Solves	Listens, aids

Each one of these teacher activities may be carried on successfully or unsuccessfully. A number of techniques have been developed for the improvement of several; for example, assigning a lesson, conducting a recitation, and conducting a testing program.

The Teacher as Evaluator. Not only is it necessary to report to parents on the progress their pupils are making, but school records of pupil performance must usually be kept. Teachers are therefore constantly called upon to evaluate scholastic achievement. This frequently involves classifying pupils into fast or slow sections or deciding whether or not they should "fail," in addition to awarding the expected "marks" at the end of each term. At least, where ratings of character traits are also called for, the academic marks are supposed to be unmixed with feelings of like or dislike of teachers for the different pupils, and to provide instead an evaluation of actual achievement. The fact is, however, that the character ratings usually follow the academic marks quite closely, suggesting that both represent a rather subjective attitude on the part of the teacher.

Where objective measures are available, as in track sports, for example, it is possible to distinguish sharply between performance and various personality characteristics. Fortunately, achievement tests (Chapter IX) have been devised which give a fairly accurate index of pupil performance. As has been stated, some schools have therefore dispensed with teachers' marks entirely, while others retain them as a general evaluation of the pupil's competence on the assumption that a consensus of such judgments is not without value as an indicator of general ability and of future academic success.

The Teacher as Case Worker. More and more emphasis is being given to the guidance function of the teacher in addition to his traditional responsibilities. It is coming to be realized that a child is not merely an inadequate repository for verbal knowledge, but a growing organism, and the nature and direction of that growth is in part under the control of the school. It is not enough that he be told, or taught, or even that he recite. He must grow and develop, and learn. He must acquire skills, he must be able to make choices, decide between alternative courses of action, meet difficulties, adjust adequately to his natural and social environment, and, if possible, develop those qualities of personality and character which will permit him to live happily with himself and with others and make his life a social asset and not a liability.

The teacher's part in all this is an important one and is becoming increasingly so. He is in a sense a social case worker, helping in the positive adjustment of children and young people to the social group. In this work he observes, measures, and guides. He *observes* behavior, adapts his instruction to the children's needs, and provides activities appropriate to each stage of their development. He *measures* perform-

ance by means of intelligence, achievement, and personality tests and scales and learns to interpret the results. And he *guides* the children in their educational and recreational and sometimes in their vocational choices. That his guidance may be the more helpful, he interviews individuals, formally, as in a clinic, or informally before or after class, he talks with their parents, consults with other advisers or agencies, and seeks to obtain as clear an understanding as possible of each case from its varying angles, that the school environment may be set up in such a way as to be the most useful and effective. Fortunately, in the majority of situations the "cases" are not abnormal but instead are perfectly normal immature individuals, each growing toward maturity in his own way and at his own rate. It is the teacher's task to assist in this process. But if he is to assist wisely and well, he must have the fullest possible knowledge of the nature of the child and the effect of different kinds of environment upon his development.

6. The Teacher's Growth and Development

After the adjustments have been made, and the rôles mastered, there is the ever present danger that they become mere routines, their spontaneity gone because the contacts with ideas and activities outside have been lost. This is indeed one of the occupational diseases of the profession. It is easy to get into a rut and stay there, to lose sight of the wide horizons that beckon to new ways and continued growth. The first year of teaching is none too early to plan definitely to keep mentally alive.

Participation in the work of professional organizations may be helpful, as may also continued university education and training, or a self-initiated reading program, that one's skill in his chosen profession will be improved from year to year. Individual research on any one of the countless educational problems which confront him provides for the alert teacher a related way of maintaining an open and inquiring mind, and keeping professionally alive. But other than narrowly academic matters are likewise properly included; for, if the teacher is to mature, instead of just growing older, he will read widely in many fields, he will cultivate friends and acquaintances in many walks of life, he will work on some hobby which permits growth in knowledge and skill, and he will participate in community activities and services; and as the years pass he will be building and enriching his own life philosophy.

In Summary

The more significant groups in the school community in which a teacher functions are delineated with a view to helping him to structure his environment and realize his relationships to its several parts. This is

a kind of first step toward the professional orientation which, if intelligently developed, will make his life and work more understandable to himself, and his contacts with others more harmonious and generally satisfying.

The second step is his analysis of his own personal qualities. College professors, school administrators, parents, and children tend to react favorably or unfavorably to different aspects of the teacher's personality. They judge competence in different ways. There is general agreement, however, on the basic teacher qualifications. Most of these are characteristics that are definitely modifiable. A teacher in training or in service can, if he wishes, improve himself in these respects, whether or not specific courses are offered for the purpose. It should perhaps be noted that any changes for the better that he can make along the lines indicated will contribute to his greater effectiveness not only as a teacher, but also as a citizen and as a person.

And, lastly, the teacher is called upon professionally to play many rôles which merge into one another from moment to moment. He maintains liaison with parents, plans courses of study, directs the activities of the group, instructs, evaluates achievement, and assists the pupils not only in their educational but also in their life adjustments. These rôles call for a keen appreciation of the kinds of situations which present themselves, an intellectual alertness and social awareness that are the very antithesis of mental stagnation. Yet, one must bestir himself to meet the challenge of the daily routine by participating professionally and socially with his fellows in the activities of the world about him.

Questions

1. What is the meaning of the following terms: social migration, marginal man, halo effect?
2. Show how incompetence of the teacher in some of the relationships described might result in teacher failure.
3. What are the teacher qualifications typically emphasized by (*a*) teacher-training institutions, (*b*) school superintendents, (*c*) pupils? What can be done to develop one's self in each?
4. What modification in attitude might be expected of students beginning their professional preparation?
5. People with experience of a year or so in teaching are sometimes quoted as saying that the actual work is quite different from the "theory" which they were taught in college. Cite illustrations to show that this attitude might be due to (*a*) failure to see existing relationships between theory and practice, (*b*) failure to see that the particulars of the job as it is performed fit into some theory, (*c*) weaknesses in training, (*d*) lack of competence.

6. Distinguish between the work of a "run of the mine" teacher and a leader in the profession.
7. Using the nine teacher qualifications discussed in the chapter, construct a graphic rating scale. Rate yourself and ask two of your friends to rate you frankly. (They may also wish you to rate them.) Discuss with them the results and consider what may be done to improve any weak points.
8. What are some of the common errors teachers make in each of their several rôles?

Readings

Bowden, A. O., and I. R. Melbo. *Social Psychology of Education.* New York: McGraw-Hill, 1937. Chapter IX.
An interesting discussion of the topic, "Why Teachers Fail," which includes causal factors in the failure of administrators and adds some suggestions for obtaining and holding positions.

National Education Association, Department of Supervisors and Directors of Instruction. *Mental Health in the Classroom.* (*Thirteenth Yearbook.*) Washington, 1940. Chapters XVI, XVII.
"In-Service Growth of Teachers," by Paul J. Misner, and "Preservice Training and Teacher Growth," by W. Carson Ryan, point up some of the personal relationships as they should be in a democratic school organization.

Prescott, D. A. *Emotion and the Educative Process.* Washington: American Council on Education, 1938. Chapter XI.
Some of the difficulties of teacher adjustment are presented together with teacher characteristics and problems of interpupil relationships.

Skinner, C. E. (Ed.) *Readings in Educational Psychology.* New York: Farrar and Rinehart, 1937. Pp. 485–486; 504–510; 514–516.
The first is a discussion of "Some Marks of a Great Teacher," by Glenn Frank; the second, of cultural influence by Margaret Mead; and the third, of teacher personality by L. F. Shaffer.

Waller, W. W. *The Sociology of Teaching.* New York: Wiley, 1932. Chapters V–VIII; XIV–XV.
The position of teachers in the community and the relationship of parents, teachers, administration, and non-teaching personnel are described and illustrated from case material, as are also questions of leadership and prestige.

Wallin, J. E. Wallace. *Minor Mental Maladjustments in Normal People.* Durham: Duke University Press, 1939. Chapter XIV.
Cases are reported tracing children's maladjustments to the defects in the personality make-up of teachers.

The Pupil's Environment

Just as the conditions under which the teacher lives, and the groups in which he participates, determine in part the nature of the contribution he can make, so do the environmental conditions surrounding the school child determine to a great extent the kind of individual to whose growth and development the teacher is to contribute. The teacher needs to "understand children," as is so often said, and that understanding is enhanced if the teacher can become familiar with the kinds of environment from which they come, even though the school system has little or no control over it. In the first part of this chapter, then, we shall consider some of the different kinds of influences in the school neighborhood, or what is ordinarily referred to as the community background. In the second part of the chapter, we shall deal with the educational environment which the pupil enters when he goes to school. It contains those elements which the school system creates and which should be so structured as to provide the kind of physical setting and group atmosphere that will help the pupils to develop their potentialities.

The school neighborhood is basically the area in which are located the homes of the children who attend school. More broadly speaking, it is the socio-cultural unit combining land, people, activities, and administrative agencies, and providing varied services and opportunities for participation. The local community shares a common culture with the wider community, the city, state, or country, and of the world conditions of which it is a part. The whole provides a background which determines the nature of the responses with which the pupils are equipped when they come to school, and which in large measure create the habits and attitudes with which the teachers must deal and on which they must build.

1. The School Neighborhood

Population Density. As the teacher first makes his way toward the school where his labors for the ensuing year are to be carried on, whether or not it is his first teaching job, he will probably note the kinds of buildings which surround it, though he may not realize what clear indicators these are of the nature of the problems he will meet. For there is a two-way influence at work: people modify the environment in which they live, and the environment molds the people. The study of this two-way influence of organism and environment is called *ecology*, a term which is familiar to many in the fields of botany and agronomy, in which the effect of the soil on plants and of plants on the soil is very important.

Communities are arbitrarily classified as rural if their population is below 2,500, and urban if it is above. If the school is in a *rural* village, there will probably be few if any large fortunes among the families represented in the school population, there will be a democratic spirit, local rivalries and animosities, and also true neighborliness, since everyone knows everyone else. There will be a strong ecclesiastical influence, perhaps with occasional "revival meetings," and some opposition to dancing, theater-going, card-playing, and smoking, and fewer divorces. The countryman is no "yokel," for his wide range of occupational activities gives him an experience with facts of all sorts that the city worker in store, shop, or office may not have. He is perhaps more virile, persevering, and patient. And he is far less isolated than he used to be, and less individualistic—if the development of cooperative marketing is any indication.[1]

Schooling no longer takes second place to work on the farm for the children, and the school may be one of the finest buildings in town. However, the school program may not be very well adapted either to the children of the village or to those of the rural areas who are transported to school by bus. It will probably follow the classical tradition, but with an admixture of more recent imports from schools in near-by cities, little modified for rural needs. The community will be proud of its school and will look askance at any change; few of the children who attend will be graduated, and fewer still go to college; the majority of the pupils will drop out to go to work on the farm or, if they can find employment, in the nearest city; or perhaps they will get some job in the home town. The young teacher will feel stifled by the social atmosphere, unless he is bright enough to see the possibilities in his work of

[1] J. H. Kolb and E. de S. Brunner, *A Study of Rural Society: Its Organization and Changes*, Boston: Houghton Mifflin, 1940, Chapters XI and XVII.

introducing the children of rural areas into the richness of their rightful heritage, and of helping to create in the school a center of enlightenment for the whole region.

If the school is in an *urban* area, greater extremes of wealth and of ability will probably be found among the student body. An atmosphere of pseudosophistication among the high-school children may baffle him at first, and result in a feeling of the futility of his work, except for the accomplishments of a few of the more gifted pupils. He will recognize that the book knowledge he has been trained to dispense is often unappreciated, and that some of the vocational courses which may have been instituted probably train for no vocation into which there is any likelihood that those who take them will ever go. He will find more self-important fathers and unoccupied mothers than in the rural areas, many of whom have not yet learned to understand or to cooperate with the school program.

Cities differ widely, however, in the opportunities they afford for living the good life. In order to measure the differences, Thorndike drew up seventy-two criteria, of which thirty-seven were measured to obtain an index, which he called "G," standing for the general goodness of life provided by the city for its inhabitants.[2] Among these criteria were the following:

Infant death rate (reversed)
Per capita public expenditures for schools
Per capita public expenditures for teachers' salaries
Per capita public expenditures for libraries and museums
Percentage of persons sixteen to seventeen years of age attending schools
Average salary of a high-school teacher
Average salary of an elementary-school teacher
Per capita public expenditures for recreation
Infrequency of gainful employment for girls ten to fourteen years of age
Excess of physicians, nurses, and teachers over male domestic servants
Percentage of literacy in the total population
Death rate for homicide (reversed)

If measurements on such items as these were high, it was concluded that the city was a good place in which to live. Using the criteria as indices and weighting each statistically, a theoretical "perfect score" of 1541 would be possible. The average of 310 cities from which data were obtained was about 670, but the range was wide—from around 970 down to 380. If one considers some of the criteria of greater significance than

[2] E. L. Thorndike, *Your City*, New York: Harcourt, 1939. Also *144 Smaller Cities*, New York: Harcourt, 1939.

others, he can determine which cities score high in these. For example, the chances that a baby will die within a year after it is born are four times as great in some cities as in others, and the probability that a girl ten to fourteen years of age will be working for a wage is over fifty times as great, a matter of considerable interest to the school. As an additional aspect of the study the effort was made to discover what factors were of greatest importance in building up the score of the good cities. Among these were the per capita income of the city's residents (I) and factors relating to their intellect, character, and ideals, their personal qualities (P). Some factors found not to be related to G are size, taxable wealth, distribution of wealth, factories, and church membership.

If the school is in a large urban complex or metropolitan area, the kind of region in which it is located will determine the type of pupils who attend. Residential, business, and industrial areas differ, but in any case the school will probably be crowded, classes will be too large, the program will be complicated, and attempts at differentiation of pupils on the basis of ability will be made. Probably the most difficult work will be in the so-called *blighted* or *interstitial* areas, sometimes referred to as "delinquency areas." These are the city slums, the region of crowded dwellings, old apartment houses, and poor sanitation, often found between the business district and the more desirable residential sections. They are the places where, besides the usual temptations, there are frequently schools of crime in which youth are given instruction in stealing, not only by their relatives to supplement the family income, but by professionals. Studies have shown that the proportion of delinquency and crime in these areas is the highest in the city, and that it tends to remain constant over the years even though the population in them shifts.[3]

Race and Nationality. Communities differ widely in the number of nationalities represented in the school population. America was settled by people of different races and different national and cultural groups. Each group brought its traditions, its customs, and its attitudes, some of which have been maintained, while others have gradually merged into what is becoming an American culture. The ideal of human equality developed by European idealists and promoted by the conditions of life in the American wilderness came into conflict with European class systems with the result that tolerance became necessary and the ways of the majority tended to prevail. Practically all so-called racial dif-

[3] C. R. Shaw and others, *Delinquency Areas,* Chicago: University of Chicago Press, 1929. Abstracted in *Department of Superintendence, Tenth Yearbook,* 1932, pp. 122–123.

ferences in the psychological sphere are known to be cultural differences, or they are not true differences but observations based on incomplete samplings.

In spite of the relative security of minority groups, much remains to be done to develop a true social democracy. Each primitive tribe, and each great nation, has taught its young that it is the best, and all other peoples are inferior. This doctrine is called *ethnocentrism*. It may be that a pèople needs such assurance to help overcome its feelings of guilt for the wrongs it has committed, or perhaps merely to bolster its morale. Whatever the reason, the efforts of the schools are often largely negated by those adults of the community who teach their children that they are better than their neighbors who came from the other side of the mountains back home in Europe, or Asia, or Africa, as the case may be.

In the school community where there are few minority group members the adult racial or nationality *stereotype* will be reflected in the attitudes of the school pupils as low as the first grade and kindergarten. Stereotype judgments are those which are made on the basis of little knowledge or experience, but in which that little is deemed sufficient for an individual to form his opinion or prejudice, and which he is likely to hold to in spite of evidence to the contrary.

When pupils of non-English extraction are found in the schools in larger numbers, two major problems present themselves. One is due to the admixture of different cultures which may be largely harmonious with American ways, yet in some respects may be distinctly discordant. National and racial animosities spring up suddenly at times, challenging the best efforts of the school to help create "one people." Customs with respect to dress, religious observance, and matters of etiquette differ, and are apt to be misunderstood and to set certain groups apart.

The other problem, especially when "foreign" pupils are found in larger numbers, is that of the so-called second generation. The original settlers were often sturdy folk who brought their language and customs with them. Their children, learning to speak English and being quick to take on American ways, while largely dependent on their elders, are nevertheless apt to feel superior to them. The children and grandchildren of the original settlers are thus likely to lose the best of their traditional culture without having absorbed what they might of the best in their native country. The school has an important responsibility to develop favorable attitudes among all cultural groups.

Socio-Economic Status. Just as it is important for the teacher to know something of the racial and national culture from which his pupils come,

so it is also often helpful if he knows about the economic status of their homes. Children from wealthy homes, who have been under the care of a nurse and a butler, may be as "neglected" as their less privileged school mates. At the other end of the scale are those from homes where deprivation has taken its toll in health and vitality. In the school building there is light and warmth, good sanitation, and usually a kindly atmosphere. For many children, these are new experiences, not met with elsewhere. Some may come to school hungry and without sufficient clothing. Their care presents quite a different problem from that of the warm and well fed.

But the cultural status of a home does not follow closely the line of economic sufficiency. Children from lower income brackets may have read more, may know more, and be more responsible and more ambitious than some whose homes furnish all that wealth can provide. The teacher will gradually come to recognize the wide range of differences in the nature and background of the pupils in the same school and in the same class, and so far as possible will seek to adapt his instruction to their varying needs.

While the cultural status of the home cannot be accurately inferred from its furnishings, what has been termed its *socio-economic status* can be measured quite accurately. A composite of items like the following is used:[4] Have you a telephone in your home? Is your home heated by a furnace in the basement? Did your father go to college? Do you have your own room in which to study? How often do you have dental work done? How many books are in your home? Children from the sixth grade up can answer such questions and thus give a rather clear indication of the type of home from which they come. It is interesting that the scores of children in two schools in the same city, one in a very good neighborhood and one in a very poor neighborhood, may not even overlap, though in many schools there is a wide range from poor to good homes.

Folkways and Mores. Every social group makes certain demands upon the conduct of its members. Most of these demands are noticed only when they are not followed. For example, a person who dresses, eats, and talks like others attracts no particular attention and seems to be under no constraint. But if he should sit down in a restaurant dressed in a toga and turban, eat his meat with his fingers, and recite Shakespeare to the person next to him, he would no doubt obtain considerable pub-

4 V. M. Sims, Score Card for Socio-economic Status, Form C, Bloomington: Public School Publishing Co., 1927.

licity. Yet none of these things is harmful or illegal. All the ways people have of dealing with each other are prescribed, within rather narrow limits, whether it be in business or social affairs, in etiquette or fashion, by custom. Such customs are called *folkways*. They differ more or less in different groups and in different lands. Nonconformists are looked at askance for no other reason than that they are nonconformists, whether they are so from ignorance or desire. It is expected that children will learn what is "proper." And if they are not taught at home, the school must accept some of the responsibility for teaching them.

Those folkways which it is believed must be followed, or harm will come to the social group, are called *mores*. Matters of religious worship and of economic and political activity often fall into this category. The heretic, the thief, and the traitor represent the extreme forms of dissidence which in these three groups, respectively, are severely punished. But it does not matter whether there is any actual danger, if the group believes that there is. It will be as cruel and often as irrational in its action as an earthquake or a flood. Youthful idealists are apt to resent the opposition of the group to their dissent, not realizing that it is a natural phenomenon.

Traditional Ideals. If one is to understand the structure of his environment, he must see it not only as separate folkways and mores, but as growing out of traditional ideals.[5] In the United States, the ideal of freedom and liberty for the individual is probably the dominating one, and has found expression in many ways. As *religious liberty*, it dominated the thinking of many of the early settlers. The necessity for tolerance of various religious beliefs, if the people holding them are to live in amity, though slow in developing and occasionally forgotten, is generally recognized. It is at the foundation of the American public school system, which offers equal educational opportunity to all regardless of creed.

The ideal of *political freedom* is equally well established, having been born of European conflict and imbedded in the Constitution. Not only was the individual to be free from the oppressive domination of the state, but he was to be free to be his best, and the opportunity for self-realization was to be open to all, without respect to the accident of birth or race. Closely allied to this is the ideal of *occupational freedom*, following which the individual was not to be bound by any caste system to follow in his father's footsteps, but instead he could strike out for

[5] Henry Neumann, *Education for Moral Growth*, New York: Appleton, 1923, Chapters V–X.

himself. The American's desire to "get ahead," to better his economic condition, has resulted in the development of guidance techniques to aid young people to make wise vocational choices.

Perhaps most important of all is *freedom of thought*, for, without this, all other freedoms are of little avail. The scientific tradition and the tradition of classical culture were both brought to this country from Europe. The latter dictated our forms of literature and the other arts, and our school programs and procedures. But the freedom of the intellect to attack new problems in new ways has rapidly rendered the old learning obsolete, and the process is still going on. Traditional formulas and maxims are being checked by scientific methods, and, if they do not stand up under scrutiny, they have to yield, whether in the area of the natural or the social sciences.

Often opposed, often unrecognized or misunderstood, the ideal of freedom in its various aspects yet serves to characterize the American way of life. It may be discerned in the attitudes and the arguments of parents and children, in the discussions of curriculum committees, and in the decisions of administrative officers and boards of education. If one learns to recognize it, he is better able to understand his community background and to deal with its problems.

Teacher Freedom. The American tradition of freedom has a bearing on the question of teacher freedom. Restrictions on the freedom of teachers are similar to those placed upon other members of a community, though in some ways they are more stringent. They may be stupid and "un-American," or, in view of the established prejudices of the community and the immaturity of judgment of the young teacher, they may be wise and even to his advantage. It is not the purpose here to support or decry this condition, but to present it so that, at least, teachers will not suffer from the restrictions through inadvertence.

Five aspects of teacher freedom have been set forth:[6] (1) freedom to hold such personal beliefs as he chooses; (2) freedom to advocate "unorthodox" causes outside the classroom and to participate in unpopular activities; (3) freedom to fill a position despite place of birth, place of residence, race, sex or marriage, political affiliation, religion, or philosophy of life; (4) freedom to regulate his own personal conduct in such things as smoking, drinking, and dancing; (5) freedom to participate in curriculum making, and in the choice of methods and textbooks.

There would seem to be nothing in the above list to object to in

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[6] H. K. Beale, "Dare Society Deny Its Teachers Freedom?" *Progressive Education*, vol. 11 (January–February, 1934), 13–25.

times of ordinary peace and tranquility. And yet many instances might be cited in which the accepted rights of free citizens, as illustrated in the first four items above, have been denied to teachers. When this happens, the individual rebel has little chance of success. The same author has indicated seven ways of securing freedom, which may be summarized as follows: (1) real professionalization, such as is found in the medical profession; (2) vigorous teachers' organizations; (3) modifications within the teacher-training institution; (4) better trained teachers; (5) education of public opinion; (6) experiments in adult education of the forum variety; and (7) acceptance of an educational platform embodying the principles of self-education, individual development, intelligent thinking, and intellectual curiosity.

Freedom, in America, is embodied in the democratic ideal, whether in educational institutions or in the wider society. In most communities, the school boards, which have the responsibility for running the schools, are chosen by popular vote, and, while abuses of one sort or another are sometimes found, the people have it in their power to correct them by legal processes. Whatever form it may take, democracy as it operates in the local community is the kind that will affect the school in such a way as to increase or circumscribe its usefulness. And it is about all the democracy the children will ever know unless the school program teaches them what democracy may be.

2. The Pupil's Home Background

Why Understand the Child? The pupil's behavior in school can be adequately understood only as the outgrowth of his previous experiences both in school and out. At this point it may be well to ask why we should seek to understand children. On the theory that they are expected to conform in certain established ways, and to learn what the school is set up to teach, it might seem that they should be made to do what they are told, and that life for those who do not should be made quite unpleasant so that they will. Such an attitude, involving autocratic control, compulsion, and punishment, has a long history, and has shown itself to be far from successful. The same failures repeat themselves year after year, and the percentage of mental disorders and of delinquency does not diminish and is said by some to be on the increase. Instead of accepting unquestioningly the traditional forms of treatment, it might be well to take a more scientific view of the situation.

Psychological studies have reaffirmed the principle that *behavior is caused* and have done much to discover what some of the causes are. A child who does not "pay attention in class," to take a relatively minor

problem, may exhibit this behavior for a number of reasons. Aside from the question of whether the work is too difficult for him or is inadequately taught, such behavior may be due to his not getting enough sleep or enough to eat, to faulty and uncorrected vision, to worry about his mother's illness, to shame over a fight between his parents, to his older brother's remark that he is earning more than the teacher, to a love affair, or to the trouble some of his pals got into with the police—to mention only a few possible causes. Obviously, the teacher's "Now, Charles, I want you to pay attention," perhaps followed by a threat of some sort, isn't going to have much effect. Behavior is caused. And to ascertain what the cause of the behavior is, or better, what the conditions are out of which it develops, one will do well to know, among other things, something of the structure of the background from which the child comes.

Status of the Family in the Community. Most school teachers and administrators come from middle-class homes, and, since they are inclined to think that theirs is the right outlook, they may fail to understand children of other class groups,[7] and perhaps even contribute to their difficulties of adjustment. It is particularly unfortunate when this occurs, for the state-supported schools must hold to the ideal of being classless, so far as the treatment the pupils receive is concerned. Parents may not know each other "socially," but their children must be accorded the treatment in school that will contribute most to their development as individuals and as citizens of the future.

Status of the Child in the Family. The influence of the family upon the social development of children is very great. Younger and older children differ somewhat according to the responsibility they have had or the attitude taken toward them by their brothers and sisters, their parents, and other relatives in the home. The basic status requirement for children in the home is *security*. This includes more than merely the provision for such basic needs as food and warmth. It has been defined as conquest without struggle, that is, the parents are on the child's side without effort on his part. It implies assurance that justice will be done but sins will be forgiven, that help may be expected when help is needed, that there is kindliness and affection to be had, and protection from the larger complexities of the world outside.

A number of conditions influence the security of a child in his home,

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[7] W. Lloyd Warner and Paul S. Lunt, *The Social Life of a Modern Community*, New Haven: Yale University Press, 1941; and John Dollard, *Caste and Class in a Southern Town*, New Haven: Yale University Press, 1937.

chief among which is rejection. Children who are disliked by their parents, who may have been unwanted, and who are treated unfairly or punished severely, are referred to as *rejected*. Their adjustment is difficult in school, where they may cling to a sympathetic teacher or become aggressive, cruel, and given to lying and stealing.[8] On the other hand, children may be *overprotected*. These may be only children, children of overzealous parents, and even unwanted children whose parents may try to rid themselves of their feelings of guilt by overdoing their duty of caring for them. Overprotected children likewise have difficulties in school adjustment, tending to show more nervous symptoms than others.

Another source of childhood insecurity is the *broken home*. Broken homes are those from which one parent, or both, is missing by death or separation. The delinquencies from broken homes are realized now to be due not only to the absence of the parent but also to antagonism between the parents which may precede a separation. Clinicians generally agree that a sane, happy home life is a good guarantee of well-adjusted children.

Another factor influencing a child's security is the *complexity of the environment*. The infant is protected from cold and noise, and from overstimulation. In his cradle, crib, or baby-pen he is kept from harm which might otherwise come to him. He is not called on to adjust to factors that are beyond his capacity. As he grows older, the restrictions are gradually relaxed, but there are places he is not allowed to go, and many matters are not discussed before him. The home can err in not being sufficiently protective; and it can also err in restraining the child too much or too long, so that he may become too complacent and docile, or he may rebel against the restrictions placed upon him.

One of the most important conditions of security is *consistency*, in contrast with caprice. It is generally assumed that we live in an ordered and consistent universe. Objects as a rule drop to the ground, not upward. Iron is always heavy, the sun regularly makes its daily round. The weather, it is true, is somewhat capricious, but not entirely so. If it were not for the ordered regularity of nature, great difficulty would be experienced in carrying on the ordinary affairs of daily life. Such a difficulty is experienced by children who at one time are punished and at another time laughed at or praised for the same kind of conduct, or who for some questionable deed are rewarded by one parent and punished by the other. Many peculiarities of a child's behavior can be

[8] Jean D. Cummings, "The Incidence of Emotional Symptoms in School Children," *British Journal of Educational Psychology*, vol. 14 (November, 1944), 151–161.

understood and dealt with more intelligently if one knows about his status in the family and the degree of security that has been his.

3. Children and Youth in the Community

Educational Resources of the Community. While the school usually provides excellent learning situations, it is recognized that these may be enriched by taking advantage of the opportunities that lie outside the schoolroom. Sometimes the school program itself is enlarged and adapted to pupil needs. Or outside agencies may be invited to contribute to or participate in the school program. In many communities schools cooperate with other civic organizations in providing facilities that the school tax budget alone could not support. In all such cases it is recognized that the pupils are a part of the larger community and that one way for them to learn to take their places in it is to find out something about it. Furthermore, if there are opportunities for profitable learning outside the school walls, the children should certainly not be shut off from them by the rules of the institution that is set up primarily to contribute to their education.

Recreational Opportunities. The recreational programs of schools are gradually expanding to satisfy the varying interests and needs of childhood and adolescence. In addition, various forms of commercial amusements of uneven value are competing for juvenile patronage. These range from ball games to motion pictures and roadhouse entertainment. With some notable exceptions, the commercial establishments provide for audience enjoyment instead of actual participation. The efforts of school people and influential laymen are gradually resulting in the establishment of skating rinks, swimming pools, baseball diamonds, tennis courts, and similar places for recreation in a wholesome environment. Until such opportunities are provided it is rather futile to deplore youthful attendance at the less desirable commercialized places.

The Community School. In most schools, particularly those of the traditional sort, the activities center in the formally organized subjects of the curriculum. Progressive schools have sought to shift the focus of attention to the pupils and to adjust the program to their interests and needs. More recently, the community has come to be recognized as a possible focal point, and the child's present and future place in it is considered the more appropriate objective of the learning process. This does not mean that the subject-centered and child-centered approaches are obsolete, or that they should be; nor does it mean that the ends of education can be found in familiarizing the child with the local scene alone.

Just how community-centered the schools will become is still a question. But it is recognized that, even apart from the goal of rendering greater service to the whole community, the school can do a better job of instruction and can adapt more adequately to the needs of the children if it will widen its environment to include the things and the events that are going on outside its walls. What this orientation means is clarified by the following list, which indicates some of the things a community school can do.[9]

1. The community school can operate as an educational center for adults. Evening classes in English, social studies, and other subjects, shop work, lectures, forums, and a recreational program are among the activities undertaken. Particularly important is such a center for young people in their teens and early twenties who have left school, whether or not they are employed, in helping to maintain and develop contact with each other, and with the larger society in which they are finding their place.

2. The community school can utilize community resources to invigorate the conventional program.

3. The community school can center its curriculum in a study of community structures, processes, and problems. Such a plan grows out of step (2) above, but can be extended so as to involve considerable curricular reorganization. The program can embrace much more than the home town, and become a program of *regional study* in which field work eventuates in contour maps, spot maps, organizational charts, and the like, and in discussions of problems which they reveal, such as those of soil fertility and erosion, forestation, city planning, incidence and causes of disease and delinquency, and many others.

4. The community school can improve the community through participation in its activities. This can be accomplished through the presentation of the research findings to the proper authorities, and in the case of older students through participation and leadership in clubs and civic volunteer organizations.

5. The community school can take part in supporting and coordinating the educative efforts of the community.

Among the materials and techniques for utilizing community resources are the following:

1. *Documentary materials*, such as local newspapers, reports, maps, charts, bills, and legislative enactments.

2. *Audio-visual aids*, including film strips, recordings, motion pictures, and sound films.

[9] Edward G. Olsen and others, *School and Community: The Philosophy, Procedures and Problems of Community Study and Service through Schools and Colleges*, New York: Prentice-Hall, 1945, pp. 17–18.

3. *Resource visitors*—people who are acquainted with one or another phase of community enterprise or have been to the region being studied and perhaps taken part in its activities.

These three schemes serve to bring the community into the classroom for observation and discussion. Those which follow bring the pupils out into the community. For them, even more preparation is needed.

4. *Interviews* with prominent citizens, oldest inhabitants, and officials and others engaged in various types of activity.

5. *Field trips* in which larger groups visit museums, galleries, exhibits, industries, government offices, business establishments, and the like.

6. *Surveys* and extended field studies in which data are obtained, assembled, and charted.

7. *Camping*, in which experience in adjustment and self-direction may be obtained under more varied and informal conditions than maintain in school.

8. *Service projects*, ranging from food and clothing collections to participation in group and social enterprises on the part of older pupils.

9. *Work experience*, in which practice is obtained in remunerative work during the summer or part-time during the school year, providing the arrangements avoid exploitation of the pupils.

One or more of such plans as these may be found in operation in many of the better schools of the country. They serve to broaden the environment in which the pupil lives and furnish opportunities for instruction in responding to the kind of stimuli with which he will later have to deal.

Social and Welfare Organizations. In many communities different types of adult organizations contribute to the school program in various ways. A number of clubs and other adult groups often meet in the school building or operate in harmony with the school program. These may be classified as follows:

1. *Adult groups*—parent-teacher associations, mothers' and fathers' clubs, luncheon clubs, adult study and recreation groups;

2. *Non-governmental agencies*—child welfare societies, charity groups, religious and denominational agencies, and patriotic societies;

3. *Governmental agencies*—health department, library, police and fire departments, and the juvenile court;

4. *Organizations for children*—Boy and Girl Scouts, Campfire Girls, Girl Reserves, and the Junior Red Cross.

In a questionnaire study from over one thousand schools the following community contacts were voted by the school principals as the most

useful, in the order given: Parent-Teacher Association, health department, public library, police department, child welfare groups, Boy Scouts, fire department, Junior Red Cross, juvenile courts, charity groups, Girl Scouts, and denominational agencies.[10]

From a more restricted study, the types of cooperation most frequently extended by various civic and welfare organizations in the order listed were the following: furnishing food and clothing to the needy, providing free lunches at school, sponsoring dental clinics, assisting the physically handicapped, furnishing schoolroom equipment, planting trees and shrubbery, and providing prizes for scholarship.[11]

One of the most recently developed social organizations to assist in relating the school to the community is the *community council,* also called neighborhood council, youth council, human relations council, and community welfare council. Under whatever name it goes, the community council is a cooperative organization of public officials and private citizens designed to improve the community and the welfare of its children. Besides dealing with various social agencies, including the juvenile court, it may conduct surveys, recommend modifications in policy of youth organizations, and carry on actual case work. In different states, a large number of desirable measures have been introduced by community councils, such, for example, as the following:[12]

Community child-guidance clinic service; recreational programs, including supervised playgrounds and community dances; the clearing of cases by local agencies through a social-service exchange; the inauguration of big-brother groups; curfew ordinances; the licensing of bicycles; parent education courses; community forums; radio broadcasts on youth problems; and a scheme of toy loans in the public libraries. Community councils have also been responsible for the development of swimming pools, tennis courts, libraries, playgrounds, community centers, and summer camps, and they have provided such special activities for children as Christmas parties, soapbox derbies, miniature boat regattas, pageants, and pet shows.

It becomes clear that the school and the family are not the only groups concerned in the welfare of children. But much is often provided in some areas and too little in others. The school's part is most effectively done when the teachers know the structure of their community and the people

[10] "A National Survey of School-Community Contacts," *Eleventh Yearbook of the Department of Elementary School Principals,* 1932, pp. 163–193.

[11] A. C. Gregory, "Community Contacts in Michigan," *Eleventh Yearbook of the Department of Elementary School Principals,* 1932, pp. 218–223.

[12] Norman Fenton, "The Coordinating Council Offers a Solution," *California Journal of Secondary Education,* vol. 15 (January, 1940), 32–37.

directing the various agencies and are able to cooperate with them to the advantage of the children.

The Child in His Group. Not only is the child influenced by his family and school environment, but also by that of his own groups. At first, on the nursery and preschool level, he is a good deal of an individualist, talking to himself and engaging in what is termed *solitary play*. Even though other children are about, he does not play *with* them, but rather by himself in their presence. His relation with his playmates is as apt to be antagonistic as it is cooperative, especially if they have toys which he wants. An intermediate stage between solitary and cooperative play is that of *participation*. He learns to play games and do things with others, even though anything which could rightly be called group activity is slow in developing.

In the prepubescent period, however, at about the ninth year, children begin to develop *cooperative organizations;* they form into clubs or gangs, taking the pattern from the adult social organization they find about them. If satisfactory clubs which they can join are already in existence, they will join these; or they may create organizations of their own.

Youth groups have been promoted by adult organizations to add to their own strength and provide for continuity of membership. Chief among these are the clubs of fraternal, vocational, ecclesiastical, and political organizations. Differing as these do in aims and purposes, the successful youth groups bear a close resemblance to each other both at home and abroad. They usually include the following:

1. A *small group* organization of twenty or so members on a level of equality with other such groups elsewhere, each under its own older leader, and often with subgroups, each under the leadership of one of the members.

2. A set of *ideals*, more or less ritualistic in nature, which must be accepted or sworn to, and perhaps a set of tasks to be accomplished.

3. A *program* made up partly of group projects or discussions and singing, and partly of athletics, including hiking and games.

There may be an organization for a younger age group, and also for an older. If there is no provision for the latter, with a transition to adult status, the club membership is likely to fall away at about the sixteenth year. In this country, the woodcraft clubs have been popular, as they have abroad. In totalitarian states all youth groups tend to be merged

into a single political organization under party control and with a strong military emphasis.

The self-organized clubs have certain rather definite characteristics. They are boys' clubs or girls' clubs, rarely with a mixed membership. The boys are at what has been termed the "gang age" or "big Injun" stage, and their organizations bear close resemblance to those of primitive tribes. Another characteristic is a strong *in-group* feeling—favorable to members, opposed to non-members, who constitute the *out-group*. A study of tribal organizations and of juvenile gangs reveals that the more humane virtues which a cultured civilization tries to inculcate in the young are developed and practiced spontaneously between members of the in-groups—loyalty (often sworn to with mystic and mighty oaths), honesty, kindness, helpfulness, and self-sacrifice. But toward the out-group there is always antagonism and dislike and sometimes hatred and hostility. Apparently the most important task of educators in this connection is to provide satisfactory clubs and organizations and to seek to extend the friendly in-group feeling to outsiders or to members of other groups. However, if a teacher or group leader is unsuccessful in this, he may find what consolation he can in the realization that mankind has not learned to do this in his thousands of years on this planet.

4. The Physical Structure—The School Plant

A Structured Environment. The conduct of any individual at any one time depends in large measure on what objects are in his environment to which he can respond. For example, a child is apt to walk through a mud puddle, play with an axe, climb a tree, or eat an apple if these objects happen to be about. If they are not, he will respond more or less appropriately to those which are. Thus, within certain limits his behavior can be directed and controlled by setting the stage, as it were. And over a period of time he will tend to develop habits of responding in accustomed ways to the kinds of things he is used to, even seeking them out if they are not immediately present.

The environmental structure, therefore, even apart from verbal directions and regulations, is an important aspect of education and contributes to the satisfaction of the pupil's needs, the development of his attitudes, and to the nature of the learning that takes place.

The Grounds. Most noticeable, perhaps, is the general appearance of the building and grounds, their attractiveness from the *esthetic* point of view. There is plenty of evidence that the esthetic aspects of the school plant have a direct influence on the conduct and happiness of the teachers

and pupils who work there, probably in large measure because of the pride and satisfaction which people like to take in the institution to which they belong. In general, it may be said that the good building, artistically, is correctly adapted to its location and in the right setting, with adequate, well-kept lawns and attractive planting, the various trees, shrubs, and vines all contributing their part to the harmonious whole.

Of course, *utility* need not be sacrificed to make the school grounds attractive. In a small, cramped play space, it is impossible to carry on the varied activities that a good physical education program can provide for the development of children and youth. Depending on the age of the pupils who attend, it would be expected that there would be a secluded area for smaller children, with sand boxes and play apparatus, and space for baseball and football, tennis and track. But there can also be space for a much richer program, including badminton, hockey, and other field games, a space that can be flooded in the winter for skating, and a school garden. An outdoor swimming pool and an outdoor theater in some places are shared with the community.

Adequate planning of the school plant also, of course, includes provision for *safety*. This usually involves protection from the chief hazard, highway traffic, and so pupils must be routed to avoid it so far as possible and playgrounds fenced in. Similarly, bicycles can often be routed away from the chief pedestrian lanes of pupil movement. Careful planning of the school grounds will often create an environment which will call out many desired responses and eliminate much conduct which would, if it appeared, necessitate disciplinary action.

The Building. What has been said concerning the school grounds applies also in large measure to the school building. Whatever the appropriateness of its architectural style, improvements can usually be made in its esthetic, utilitarian, and safety features. With respect to safety, the traffic problem is superseded by that of the removal of fire hazards. The beauty and utility are properly viewed not only from the standpoint of adults, but also from that of children. There is much to be said, for example, in favor of wall boards which succeeding school generations of children can decorate with posters or with their own drawings and paintings as against tinted plaster which they must be constantly reminded to keep in good condition. Obviously, pupil responses are more satisfactory if the general conditions are right, such as lighting, heating, ventilation, sanitation, and general cleanliness.

The environmental structure affects the pupils most directly in the *class* or *grade rooms*. The old-fashioned seat, on the back of which was

attached the desk of the next pupil behind, was a remarkable invention. Economical of lumber and space, it also limited the responses of the pupil so that practically all he could do, besides his unpleasant task, was to find satisfaction in putting his toe in the crack in the seat in front, or out in the aisle when someone was passing, or he could knock the books off the desk of the person behind him! Such behavior could usually be detected, however, and properly punished. The newer type of light, mobile furniture with the desk of the pupil attached to the seat he occupies makes more demands on the versatility of the teacher, but it also provides wider opportunity for desirable responses on the part of the pupils.

The mobility of the seats is a part of the general principle of flexible design which permits adaptation to different groups of different sizes that may be brought together for varying purposes as the occasion may demand. Further modifications are found in the increase of opportunity for the use of visual aids in instruction. Besides the usual blackboard, which is much restricted in area, provision is made for wall charts and maps, display cases, pictures, and means for showing slides and motion pictures.

More striking than in the regular classrooms have been the recent modifications of school architecture and furnishings in the development of *special rooms*. The well-planned school building has adequate utility space for storage, and pupil entrances and hallways are not blocked by the delivery of goods and supplies. A kitchen and cafeteria that can be operated efficiently have been included in school buildings for some years now. Improvements have been made in laboratories and the auditorium; music rooms are acoustically treated; shops, art rooms, and clinics for medical and dental examination and sometimes for treatment have been added; libraries have been developed; and the gymnasium, separated from the rest of the building, has been improved in many ways, particularly by providing more hygienic shower and locker rooms. Ingeniously devised, multi-purpose rooms reduced the expense of construction. School buildings are likewise equipped not only with the usual laboratory apparatus and display cases, but with mechanical, visual, and auditory aids, including apparatus for showing sound films and for radio reception and broadcasting. The most successful school buildings are those in the planning of which the architect, the administrator, and the teachers concerned, as well as the pupils, have all participated.

It should be clear that the school plant is not just a building set on a lot, but is an expression of the educational program and educational philosophy of the school. It is in a real sense a part of the curriculum.

It is planned and set up with a view to directing the development and growth of the pupils. The responses which they learn to make to the various aspects of their physical environment are as much a part of their education as those they make to the teachers' questions or to the words and numbers in the books they study.

5. THE DYNAMIC STRUCTURE OF THE SCHOOL

The Field of Forces. Various influences of the physical and social environment which affect the growth and development of children have been noted. It now seems advisable to examine a little more closely into the way in which these influences may operate. To do this, we shall want to imagine ourselves observing children and their teacher or group leader through a one-way screen which will enable us to see and hear what goes on but will keep us from being a part of the group. If we do this, we can readily think of the children as being attracted or repelled by the conditions in which they find themselves as if by physical forces. An area within which individuals interact in relation to their environment is sometimes referred to as a *field*, or field of forces, on the analogy of a magnetic field. The systematic elaboration of the situation is called "field theory," and the study of social forces among people in a group, "group dynamics." Some of the field concepts are helpful in leading to a better understanding of the behavior of children, and of adults as well, when they come together in school grades or classes, in clubs, committees, or even for informal discussion. Let us take a simple example.[13]

A small child may be on the floor, with a piano bench which acts as a *barrier*, B, between him and an incentive, a toy or a piece of candy (Figure 4). In this simple field of forces the child, C, is stimulated by the incentive, I, to move toward the barrier. The drive or demand value in the situation directed toward I is called the *valence*, V_I, a positive force in the direction shown by the arrow. When the child comes to the barrier he will either push it aside or start to go around it, C', in which case the direction of the valence changes, V'. Failing this he will be blocked, though perhaps continuing to strive and showing emotional symptoms. If, instead of the piano bench, a firm commanding "No!" is spoken by the parent, the blocking would be similar. There are various ways of getting around such verbal barriers.

If the situation is made somewhat more complicated, to resemble a school situation (Figure 5), the field of forces is confined within a "barrier" which may be thought of as the walls of the school building,

[13] Kurt Lewin, *A Dynamic Theory of Personality*, New York: McGraw-Hill, 1935, Chapter VI. Figures drawn from Fig. 6, p. 122.

or the rule that pupils must go to school and do what the teacher tells them, enforced by parental expectations and, in the last analysis, by the law. Here the task, T, has a negative valence and is interposed between the child and the incentive, I. The incentive may be approbation, a good
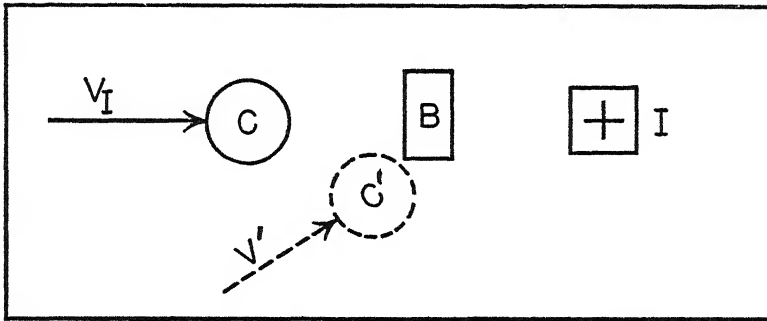

Figure 4.   Control of Behavior in a Simple Situation

mark, graduation, "honors," and the like. The negative valence of the task tends to drive the child away from it in spite of the *positive* valence of the reward supplemented by the negative valence of punishment, P—low marks, failure, disapprobation, and the like—which push him in
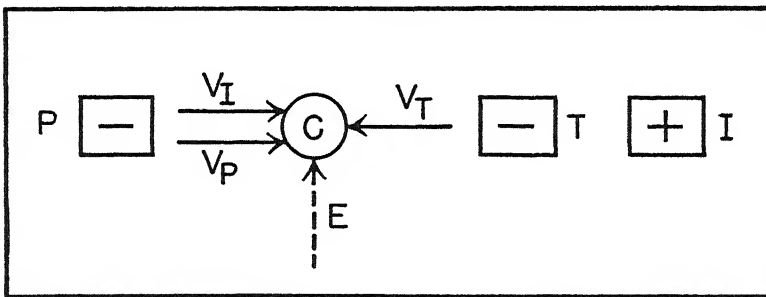
Figure 5.   Control of Behavior in a Complex Situation

the other direction. If the conflict situation is sufficiently evenly balanced, the direction will change, and the child will escape, E. He will remove himself from the "field," that is, run away from school, "play hookey," become a truant, or perhaps escape in imagination by day-dreaming. It may readily be seen that, if the task itself is attractive and thus has positive valence, the conflict disappears.

Democratic vs. Autocratic Control. Now let us see how the field of forces operates in the area of administrative control. The sources of control in any group or organization may be viewed as of two kinds. One, the autocratic, is imposed from without and maintained by force or compulsion. It need not be unpleasant, but those who live under it know who the boss is. They have to do what he says and have no effective part in determining policy. In the wider political sphere, he is personified by the absolute monarch, the king or tyrant, whose word is law, and from whom there is no appeal, because he holds his power by divine right, or by wealth, or military or police power against which the efforts of those he rules are quite ineffective. Democratic control, on the other hand, obtains its powers through group participation and consent. The opinion of the people may be made sufficiently effective to direct or nullify the policies of the ruler, who serves as their agent, and even remove him from his position. In any school or any classroom the principle of control lies in one or the other direction.

Very interesting comparisons have been made of small groups of children observed working under these two different forms of control, and also under a third type, called laissez-faire.[14] The behavior characteristic of the autocratic group was found to be of a sort so familiar in schoolrooms that some have thoughtlessly believed that it represents the natural characteristics of children instead of the behavior induced by a particular kind of environment or group "atmosphere." The children studied were ten-year-olds who were formed into small clubs engaged in making theatrical masks. The situation was normal in that such club activities were common in the school, but the groups were equated, and from observations through one-way screens a complete record was made of all conversation and activity. In addition, certain variations were introduced such as exchanging members from one group to another, and having the leader leave the room; also, the children were interviewed afterward to determine their attitudes. The characteristics of each group are worth noting.

In the *authoritarian groups*, the policy, the techniques to be used, the work assignments and criticisms of work done all came from the leader.

[14] Kurt Lewin, Ronald Lippitt, and R. K. White, "Patterns of Aggressive Behavior in Experimentally Created Social Climates," *Journal of Social Psychology, Bulletin for the Psychological Study of Social Issues*, vol. 10 (May, 1939), 269–299. Ronald Lippitt, "An Experimental Study of the Effect of Democratic and Authoritarian Group Atmospheres," *Studies in Topological and Vector Psychology I, University of Iowa, Studies in Child Welfare*, vol. 16, No. 3, 1940, 43–195. Ronald Lippitt, "Field Theory and Experiment in Social Psychology: Autocratic and Democratic Group Atmospheres," *American Journal of Sociology*, vol. 45 (July, 1939), 26–49.

The task, as in Figure 5, had negative valence. Toward the leader the children were submissive or they made persistent demands for attention. Remarks and acts showing open hostility were thirty times as frequent in the autocratic as in the democratic group, and aggressive behavior was eight times as frequent. The aggression was directed not only against the task and the leader, but also, when "displaced," against other group members, who sought to dominate each other, and who would lose social prestige if they acceded to another's domination. Sometimes the aggression was centered on "scapegoats," who were picked on by the other group members. As compared with the democratic group, more than twice as much of the language was "ego-involved," that is, the talk of the children centered around themselves and their desires, and was used to defend their positions against others in the group. On the other hand, some of the autocratic groups were so thoroughly under control that their behavior was not aggressive but apathetic, though the more apathetic groups showed outbursts of aggression and practically exploded when given a chance, as when the leader left the room (the field), or when the control was changed over from autocratic to laissez-faire or democratic.

In the *laissez-faire groups* the leader merely gave out materials, and offered help and advice only when asked, putting the children on their own without participating in their activities. This, and not democracy, is the opposite of authoritarian control, and it proved to be even less desirable. The children were more aggressive in this situation than they were in the autocratic groups because of the greater number of conflicts between individual motives and goals. The leader was described as "too easy-going." "We could do what we pleased with him."

In the *democratic groups*, policies, techniques, activities, and the division of tasks were matters of group decision. Of the leader one child said, "He was a good sport, worked along with us and thinks of things just like we do." In these groups aggressive reactions were lowest. One child who was transferred from the autocratic to the democratic group reported: "It was fun where we worked together. It was different in the other club, they were kind of fighty." In contrast with the authoritarian group, these children did not lose but gained prestige by acceding to the group motives and goals.

In the autocratic school structure, direction comes from above. The superintendent tells the principal, the principal tells the teachers, and the teachers tell the pupils. It may be that this hierarchical, one-way plan is more efficient, but there are other characteristics to which the field theory approach has called attention. For example, the children are likely to

become aggressive or subservient and apathetic, while teachers and administrators have been observed to develop an obsequiousness toward their superiors and to become harsh and dictatorial toward those below them in the hierarchy. In the laissez-faire type of social organization, the teachers are likely to become easy-going and ineffectual, while the pupils may waste time and perhaps fight among themselves, each trying to advance his own interests against those of the others.

In the democratic school structure the pupils and teachers participate in the control, while it is the duty of the administrator to stimulate suggestions and coordinate the various activities. In such an organization, as much responsibility is allowed each individual as he can assume, suggestions come from the group as well as criticism, and the reward is the satisfaction that comes from group approval. From such experiments as the one cited, it appears that democratic control tends to produce self-discipline and to make for enlivened interest and cooperation on the part of the group members.

The Curriculum and Pupil Choice. The school curriculum as well as the school organization may be evaluated on the democracy-autocracy scale. The curriculum, or learning activities in a school grade or subject, may be characterized as autocratic if it is built by specialists in the various fields of instruction. It is assumed that there are certain essentials of knowledge and skill which should be taught in the schools anyway— supposedly the three R's in the elementary school, and the traditional subjects in high school and college. The opposite is a curriculum which is not planned beforehand and imposed, but, instead, is developed by the pupils in cooperation with the teacher. The view of those who support this procedure is that the inquiring mind of the child should be the chief determiner of the curriculum, that, if the opportunities are sufficiently rich, children will seek out the activities which they need and which will contribute most to their own development. This principle is referred to as *self-selection.* It can perhaps be seen that both these positions in their extreme form are untenable, practically and theoretically. Few, if any, contend that the child should be the sole determiner of what is good for him, in the curriculum or anywhere else; and equally few would argue that children should be made to learn what is given them to learn without any regard to their stage of development or their interests and needs.

However, comparative studies made of pupil progress have concluded that pupils under the freer, more democratic type of curricular and organizational structure learned quite as much of the "essentials" as pupils

taught on the more formal pattern, and that in addition they learned a great deal more that was not in the prescribed course of study, that they read more, looked up more items, raised more questions, showed more intellectual curiosity and initiative, and found more enjoyment in the process.[15]

Student Government. Another aspect of organization in which schools reveal a democratic or autocratic group atmosphere is to be observed in their arrangements for pupil or student government. In the more autocratic type of school, there may be no machinery set up whereby pupils may express their opinions or participate in any way in managing their own affairs. The truly autocratic administrator sees no need for such a plan; he perhaps feels that he can manage everything much better himself. Or the form may be there without the substance. A student council may serve only as a sounding board of student opinions for the benefit of the administrator and have no real power or responsibility. It may be merely a yes-group that is expected to listen to what the principal or faculty adviser reports on what he has done or is going to do. The pupils know that any initiative on their part will be quite useless. Their lack of interest, as might be expected, is revealed by absences, apathy, or inattentiveness, or by unruly behavior (hostility or aggressiveness), signs which the administrator is likely to interpret as incapacity for self-government rather than as the natural reaction to autocratic control.

In the democratic type of school, the basic unit of student organization is the grade, class, or homeroom. In such relatively small groups, each person knows every other person, or will before the term is very far advanced. The processes of nomination and election are practiced where the disadvantages of unwise choices become obvious but are not serious. Discussion results in a growing realization of the qualifications other than popularity that are desirable in public office, presidents gain experience in appointing committees, and committee chairmen in getting action. Representatives to central agencies or to the student council learn what representation means with the conflicting demands of smaller groups and get practice in reconciling them with the best interests of the larger group.

It will be assumed that pupils will make mistakes—as do their elders sometimes. They cannot be expected to hold committee and council meetings, to make suggestions for dealing with problem situations, to discuss, modify, reject, or adopt, without practice on matters of relatively small moment. They cannot be expected at once to grasp the dif-

[15] W. M. Aiken, *Story of the Eight-Year Study,* New York: Harper, 1942.

ferences between anarchy and democratic organization with responsible leadership.

In the restructuring of any school group along democratic lines the teacher or group leader, of course, is an important influence, suggesting, discussing, and raising questions, but never ordering unless it is absolutely necessary. It may be that what eventually transpires is what he had planned in the first place. Or he may discover that the direction taken is quite as satisfactory or even more desirable than what he had decided would be best. But in either case, whether the pupils merely think they do it or actually do it, it is done more intelligently, with less resistance and more enthusiasm. The "task" has positive instead of negative valence so that doing it becomes its own reward, and the conflict is eliminated.

6. The Dynamics of Group Interrelationships

Communication. A further analysis of interpersonal relationships will show why it is that democratic group structuring is more satisfactory than autocratic. Further exploration will reveal some of the ways in which individuals function that contribute more or less satisfactorily to the attainment of group objectives.

If one person is to understand another and what he is doing, the first essential is that he be able to communicate with him. Even if the two speak the same language, real communication is not always possible. The language he uses may be too technical, or his true motives may be suspected to be different from his facile explanation. Sometimes a person acts in a peculiar manner, and his friend is at a loss to know whether he feels sick, has suffered financial reverses, or believes himself slighted. He communicates by his actions a changed attitude, but not the reason for it, and his friend may feel insulted and ask no questions, continuing the misunderstanding. The barrier becomes complete when they "won't speak to each other," a breakdown of communication that is more common than it should be. Even more common is the barrier to communication between those in positions of power and those over whom their power is wielded. A principal (or a teacher) may announce a new procedure. and the teachers (or pupils) may not see any good reason for changing their ways and may wonder "what he is up to now," and decline in various ways to cooperate.

In such situations as these, it is necessary first to find a way to open the channels of communication so that the situation may be clarified. But it is better to operate in such a way that the breakdown in communication will not occur in the first place. And this is where the democratic procedure comes in.

Group Atmosphere. In a small group, say from four or five to twenty-five or thirty persons, satisfactory communication depends on group atmosphere. In larger groups, the same is true, but in such groups the communication tends to be a one-way affair, from speaker to audience, with little or no interaction among the members. The existence of myriads of clubs, committees, boards, and councils in which individuals take part suggests the desirability of providing experience and training in small-group action for greater effectiveness. The atmosphere of such groups has been variously characterized. It may, of course, be stiff and formal or the opposite. It may be hostile to the leader or to proposed change, or it may be friendly and cooperative. It may be interested or apathetic, attentive or inattentive. But, perhaps most important of all, it may be *permissive* or inhibited.

These various characteristics may be recognized as growing out of the degree of domination the group believes the leader is employing. But if any progress is to be made in communication leading to mutual understanding and to performing the functions for which the group is meeting, individuals must feel free to communicate. How is such a permissive atmosphere created? First in order, is a full and frank explanation by the leader of what the situation is that is before the group. Secondly, there must be a clear realization that the work hasn't already been done and the group is just being informed or is serving as a rubber stamp. Growing out of this is an indication of the questions that remain to be answered and tasks to be performed. If group members do not yet feel free to participate they may be asked individually for their opinions as to procedure. Any suggestions made are to be accepted as worth-while contributions, though not necessarily to be adopted. Of course, if there is some skulduggery afoot, the permissive atmosphere may produce embarrassing questions, and if these are not answered satisfactorily the atmosphere may shift to one of hostility or apathy according to circumstances.

Advantages of Democratic Group Structure. It may now be seen that a democratic group structure, characterized by a permissive atmosphere that allows for a full degree of communication among members, has certain advantages not possessed by an autocratically directed group:

1. It develops participation in discussion which produces a better learning situation than passive acceptance, in that misunderstandings can be identified and clarified. It utilizes the knowledge and experience of the group members, and often reveals the need for further information from outside the group membership.

2. It furnishes "containment" for a diversity of backgrounds, interests, and opinions, and for interpersonal tensions which might otherwise take the form of hostility toward the leader or displaced aggression toward other group members. It likewise tends to avoid hasty and ill-advised action.

3. It provides for individual viewpoints and the satisfaction of individual needs that might not be known or respected if more arbitrary methods were employed.

4. In general, it provides for the development of individual members in group functioning, for evaluation of progress made, and for continuing individual action and cooperation.

With these advantages, certain disadvantages should be mentioned. It is slow moving. If the movement is too slow, there is likely to develop a feeling of futility, especially if ends are lost sight of, although the members may find social satisfaction in a "good discussion." There is a danger, too, that the technique may serve as a façade for group manipulation, but this need not occur if the members are sufficiently alert. Lastly, the objectives may not be attained because of ineffective leadership.

The Leadership Function. It is obvious that the degree of success of group functioning depends very largely on the leader. Moreover, since leadership is coming to be recognized less as a personality characteristic and more as an intra-group relationship, a realization of the nature of the leadership function becomes of great importance. In a sense, the teacher is a group leader, but it is desirable that pupils share this experience in order that they may have the necessary practice with their peer groups that will serve them in good stead during their school years and afterward.

The true leader is in a real sense created by the group, for a nominal leader without followers is, of course, no leader at all.[16] The leader must first have prestige with the group, which means that he is respected for qualities which the group values, be they athletic, intellectual, or social, or any other. Furthermore, the leader must be one whom the group believes can take them where they want to go, even though they may be somewhat uncertain of the objectives themselves.

The leader of a democratic group is not a commander. There is a definite place for the command post in a democracy, like that of a captain of a ship or the chief of a fire department, when the functions have been predetermined and agreed on, and when responsibility is clearly delegated. The democratic group discussions for such situations

[16] Ruth Cunningham and associates, "Leadership and the Group." *National Education Association Journal,* vol. 37 (November, 1948), 502–503.

precede, at the policy-making level. It may happen, however, that an individual may confuse his two rôles of commander and leader to his own detriment and that of his "command" or group.

The leader has to recognize that it is the group that sets the goals and decides procedures, but that he has both an educational and a training function. His educational function is to provide the information which he may have concerning the details of the matter that brought the group together and which led to his selection as leader. His training function is to develop the members into more effective group participants.

Functional Rôles of Group Members. Few have attended committee or board or council meetings who have not had the feeling that time was being wasted because certain members talked at length on irrelevant matters, aired their grievances, or generally disrupted proceedings. Several such response patterns or rôles have been found to recur in small-group situations. They are in marked contrast to the more constructive rôles played by members of more mature and effective groups. Some of these rôles are outlined briefly below.[17] They are divided into three sections: group task rôles, which promote the objectives for which the group has met; group building and maintenance rôles, which tend to improve its functioning; and individual rôles, which tend to satisfy the participant's need as an individual, and not as a group member:

1. Group task rôles

   (*a*) *Initiator-contributor*—idea person, suggests different procedures or solutions
   (*b*) *Information and opinion seeker*—asks for the facts or implications
   (*c*) *Information and opinion giver*—resource person, perhaps the leader, authority
   (*d*) *Elaborator*—gives examples, indicates possible consequences
   (*e*) *Coordinator*—clarifies relationships, harmonizes proposals
   (*f*) *Orienter*—clarifies group position, summarizes, and questions possible directions of group activity
   (*g*) *Evaluator-critic*—doubter, questions facts, practicality, value
   (*h*) *Energizer*—stimulator of desirable action
   (*i*) *Procedural technician*—manager, procures and arranges materials and equipment
   (*j*) *Content recorder*—recording secretary, the group memory (A blackboard record has been found more useful than the minutes at the next meeting.)

[17] Kenneth D. Benne and Paul Sheats, "Functional Rôles of Group Members," *Journal of Social Issues*, vol. 4 (Spring, 1948), 41–49.

2. Group building and maintenance rôles
  (*a*) *Encourager*—approves or at least welcomes contributions
  (*b*) *Harmonizer*—mediates differences, relieves tensions in various ways including clarifications and friendly, or perhaps humorous, remarks
  (*c*) *Compromiser*—yields to another, comes half way to maintain harmony
  (*d*) *Gatekeeper and expediter*—time keeper, encourages participation of others
  (*e*) *Follower*—goes along

3. Individual rôles
  (*a*) *Aggressor*—disapproves, attacks, belittles
  (*b*) *Blocker*—resists, disagrees, objects, opposes
  (*c*) *Recognition seeker*—prima donna, boasts, seeks limelight in various ways
  (*d*) *Playboy*—indulges in horseplay, jokes, laughs, interrupts, seeks to get group off the track by "out of field" behavior
  (*e*) *Dominator*—interrupts, holds the floor, acts important
  (*f*) *Special interest pleader*—calls for help for his own problems or speaks for a special group instead of for the wider interests the group is set up to serve

The more experienced group members will be aware of these different rôles that people play, recognize them when they appear, and themselves endeavor to keep out of the "individual" category. The group leader, in particular, will recognize and seek to encourage those who are playing positive rôles and help the others to find status in more constructive ways. He will also learn to become aware of certain group phenomena such as the following:

1. Areas of disagreement, and levels of agreement where the group can start
2. Cleavages into subgroups due to such conditions as loss of interest, differences of opinion, or desire for communication of opinions or attitudes
3. Attitudes of individuals toward the leader as a leader, or as a person, and to other group members, e.g., hostility, rejection, detachment, cooperation, devotion
4. Direction or shift of discussion toward or away from group objectives
5. Group readiness for decision-making or action

Group Self-Evaluation. A group can improve its functioning by observing and evaluating what is transpiring. For this purpose a *group*

observer or *process recorder* is sometimes chosen, who notes the conditions that tend to facilitate or interfere with group accomplishment. It is he who provides the *feedback* to the group. This is the report based on his notes and sometimes on the compilation of a rating the group made at the preceding session on the success of the meeting, together with a statement of weaknesses and strong points and suggestions for improvement.

It may readily be seen that the group observer needs to have as much skill as the leader if he is to see the important things and report back in such a way as to hurt no one's feelings and at the same time to improve group procedures. He would note such matters as the following:[18]

1. How well was the group oriented with respect to its task and the time available? Extent of understanding of purposes and procedures, availability of needed information.

2. How well was the group motivated? Unity of purpose, extent and constancy of interest, subordination of antagonisms.

3. What was the nature of the group atmosphere, permissive, cooperative, and friendly—or inhibited, competitive, and hostile?

4. How valuable were the contributions of members? Generality of participation, pertinence of contributions, extent of their acceptance, degree of bias and ego-involvement.

5. How well did the leader, recorder, and resource persons serve the group?

The group will accept favorable criticisms of the process recorder easily enough, but it may take a little time for them to accept unfavorable criticisms. If any adverse criticisms are first directed at the leader (who presumably views the situation objectively and "can take it"), and if the recorder uses such phrases as "I had a feeling that . . ." or, "I got the impression that" some less favorable things were transpiring, and asks if any others felt the same way, he will be more apt to avoid the subjective protectiveness and inability to accept criticism of some of the less experienced or less competent group members. Greater objectivity, it is expected, will gradually develop on the part of all.

It should be noted that when the group observes and evaluates itself, it is, as one might say, taking up a special order of business, shifting its problem from the main purpose to the question, "How well are we doing?" Such a taking stock is valuable if the main purpose is to be achieved.

[18] David H. Jenkins, "Feedback and Group Self-Evaluation," *Journal of Social Issues,* vol. 4 (Spring, 1948), 50–60.

It is clear that in the usual classroom situation, when the teacher is both leader and resource person, and when instruction is actively sought, there is less need for such an interplay of communication. A permissive atmosphere in which questions are accepted at any time may be all that is needed. However, there are many occasions when group consideration of the reasons for studying this or that, and group decisions as between equally educative topics, projects, and the like, would result in much better motivation and much clearer understanding.

It is probably equally clear that most faculty meetings, teacher committee meetings, and other types of gatherings could profit by a recognition of the nature of group dynamics and by the employment of some of the skills that have been suggested. Certain it is that children and young people can properly be given the opportunities for group discussion and group decision and have the benefit of skilled assistance in employing procedures that will enable them to function more effectively in a democratic society.

7. The Pupil in His School

Motivation and School Structure. One of the most troublesome problems of many teachers is that of motivating the pupils, of making them want to do what they are supposed to, partly in the matter of right conduct, but more especially in their school work. It is perhaps already evident that the amount and kind of motivation shown by the pupils is directly related to the school's dynamic structure. If the curriculum is imposed and seems to bear no relation to the interests and needs of the pupils, they must be motivated almost entirely by an artificial system of rewards and punishments. With a more flexible type of program, it is usually found that there are plenty of valuable educational experiences which pupils want and will work for; and, if the less enjoyable activities are actually shown to be necessary for the attainment of their accepted goals, their school work will receive all the attention that may well be expected.

If a pupil's work is not continuingly stimulating, the fault lies not with the pupil but with his environment. Without now considering the all-important health factors, or his type of home experience, though these are often the key to the difficulty, lack of motivation in a pupil calls for a careful survey of the situation. The pupil may be right. He may be too young or too old for the instruction that is offered. He may not see that it is getting him where he wants to be, and perhaps it isn't; what he wants to do may be better for him. If the pupil is mentally com-

petent to do the work expected of him, it may be that one or another of various schemes will help, such as finding what difficulties are acting as a barrier to his further progress, breaking the work up into units each of which can be accomplished, the reward being in its accomplishment, and finding out what the pupil is interested in and relating the work to that.

"Discipline" and School Structure. The matter of discipline, in the sense of keeping order in school, is dependent in part, as we have seen, on the personality of the teacher—his character and peculiarities, his attitude, and whether or not he gives the impression of being kindly and helpful and, at the same time, competent. But it is also dependent on the school structure. Autocratically imposed rules, many of them for adult convenience, and most of them restrictive in nature, have a negative valence. The pupil's concern is to avoid doing what "they" want, and also to avoid the punishment "they" will inflict, instead of being about what *we* want, and what needs to be done. If the teachers and principal are thought of as hostile powers, they will be circumvented and opposed as often as may be.

If, however, the adults who appear to be running the school are accepted as leaders of democratically run groups, the structure of the field changes completely. What was, before, a disciplinary situation becomes a problem to the solution of which all will contribute suggestions. The temptation of a pupil to rebel becomes much less strong, for it is realized that the rebellion is against his own group, and other ways are open to him to get what he wants, if there is any sense to it. His aggressiveness is controlled by public opinion. It is "contained" by the group instead of being supported as a daring but welcome expression of their opposition.

Departmentalization. The large mass of children who come to school must, of course, be broken up into smaller groups that their needs may be more adequately met. The proper basis for the division of pupils into groups has been the subject of much discussion and experimentation. Should it be according to age, knowledge, stage of social development, mentality, special disability, vocational objective, or the alphabetical order of the initial letters of their last names? These and other bases of classification are all in use. The departmentalization of subject matter, as a result of which pupils are grouped according to the subjects they take, tends to break up any natural groups which may have formed. It has to be admitted at the outset that any plan of classification that is

followed will have disadvantages, for a unity with respect to one variable implies a lack of unity in others. Pupils of the same intelligence are of different ages and have different interests and vocational objectives; pupils of the same age differ widely in intelligence; and so it goes. In the elementary school, nearly half the pupils in the fourth grade, for example, are above and below "fourth-grade ability," with a range, usually, of about seven years. In the high school, pupils taking any one subject vary widely in all other respects.

The breaking-up of the natural social groupings of the immediate circle of friends, or the recombining of children from different socio-economic, religious, and political groups, has certain disadvantages. Social psychologists have emphasized the importance of *group priority*, that is, the fact that individuals are what they are primarily because of the groups to which they belong. But these groups are not artificial classifications in which their names happen to fall. They have a unitary character; their members have a sense of belongingness and a we-feeling. The more or less arbitrary classification of pupils tends to destroy the unity of their own groups.

The tendency is opposed often by the pupils themselves through cliques and through secret societies sometimes maintained sub rosa in opposition to school regulations. The results of the departmentalization of subject matter and of other artificial groupings may be compensated for by the school organization in various ways, chiefly by homerooms, club organizations, school activities, and by systems of individual and group guidance and counseling. The *homeroom*, made up originally of pupils many of whom came to school together, maintains itself as a unitary group through all the shiftings necessary in a departmentalized school. *Clubs* and various school "activities" permit individuals of like nature to follow their interests and hobbies together. *Group counseling* provides an opportunity for pupils who have not become fully adjusted socially to find help among their kind in learning their way about. And systems of *individual guidance* are set up to take care of the temporary misfits and get them started if possible along the line of satisfactory adjustment in some group in which they can feel at home and so obtain a little of the security they need.

Rôle. Each pupil has his part to play in the complex drama of school life, apart from the one he may play in his family, his gang, or in some small action or play group of which he may be a member. His rôle may seemingly be quite a simple one, merely to study his lessons and do as

he is told. If this is all he has to do, however, the school is not providing him with the experiences in social learning to which he is entitled. Beyond this minimum, schools differ widely. In one type of school he may serve as a "monitor"; or be a member of a team; in another, he may be a member of a committee, a chairman, or a class officer. In any school he has a right to "be somebody," not just another pupil. If opportunities of a legitimate sort are not provided, many pupils will create their own parts and "ad lib" to the despair of the teacher; one, perhaps, being always able to get a laugh, another to make a funny noise, or a third to get the personal attention of the principal.

Status. The rôle a pupil plays is what chiefly determines his status. This term is one which in classical times used to apply to the standing an individual had in the state, whether a slave, freed man, citizen, or the like. His treatment before the law and otherwise would then be in accord with his status. It has come to apply more generally to the standing an individual has in the eyes of his fellows, his degree of acceptance by his associates in a particular group. In some cultures, this depends entirely on birth and family; in others, on wealth, accomplishment, club memberships, or personality factors. The status of a child in school in one respect is determined by his age and grade; for any one grade, those below are the little ones, and those above are important because they are above. From the teacher's point of view, however, status may depend wholly on a pupil's academic achievements, but these may have little influence among his fellows. For them, it depends on his rôle, how it is regarded, and how well he plays it. A none-too-excellent football or baseball player if he "has the right spirit" may have a higher status than an excellent tennis or croquet player; but a good football or baseball player is likely to be more highly regarded than a mediocre one.

The individuals of more exalted status have *prestige*, and thus are apt to be influential in matters quite outside the realms in which they are competent. In about every school a football captain, if there is one, has been elected president of something just because he was the football captain. Of course, in the adult world generals have become the heads of states seemingly for no other reason than that they were successful generals; and specialists in one line have gained a hearing for their pronouncements in others where their knowledge is no greater than that of the ordinary man.

Some have difficulty in understanding what their status is. Either they do not know "just where they stand" and what is expected of them, or

they think that by reason of their family or accomplishments their status in school is higher than it really is, a condition which is colloquially referred to as a "swelled head." At the other extreme, the modest souls may not realize the esteem in which they are actually held. The matter is still further complicated by the fact that the grade or class is not a unit, but is made up of individuals and of small, shifting groups, each with attitudes of acceptance or rejection toward the others. Recognition of the nature of the attitudes within a group is, of course, a first step in helping children to adjust more satisfactorily.

Sociometry. The interrelationships involved in such acceptance and rejection can be determined by the so-called *sociometric technique.*[19] The procedure for obtaining the data is simple. Each member of a group—grade, club, class, cottage, or the like—is asked to write on a piece of paper the names of the pupils (usually not more than three) he most enjoys being with. The questions are worded according to the age of the children and the nature of the group; for example, who would you most like to play with, work with, eat lunch with? Each child thus has an opportunity to choose and be chosen by members of his own group. The choices can then be charted on a sociogram (Figure 6), each pupil being represented by a number with lines connecting his number with that of each child who chooses him. The numbers are arranged in concentric circles like a target, with the upper quarter—those who are chosen most frequently—in the center ring, the second quarter next, the third quarter next, and the quarter chosen least frequently in the outside ring. (The upper and lower .02 to .05 of the group are sometimes charted in the inner and outer circles respectively to indicate a statistically significant differentiation.)

Those who are chosen most frequently and who therefore have a number of lines or arrows from the other pupils pointing to them are the most "popular" and are called *stars.* Those who are chosen by very few or by none at all are called *isolates,* who may be either *neglectees,* who are so inconspicuous or colorless as to be overlooked, or *rejectees,* whose behavior is undesirable or offensive. Isolates are quite likely to withdraw from the group voluntarily, giving various reasons for leaving. A study of a sociogram is often very revealing since it gives

[19] J. L. Moreno, *Who Shall Survive? A New Approach to the Problem of Human Interrelations,* Washington, D. C.: Nervous and Mental Diseases Publishing Co., 1934. New York: Beacon House. Mary L. Northway, "A Method for Depicting Social Relationships by Sociometric Testing," *Sociometry,* vol. 3 (April, 1940), 144–150. Ruth Cunningham, *How to Construct a Sociogram.* Bureau of Publication, Teachers College, Columbia University, 1947.

the teacher or group leader a clear idea as to which children need special help in adjusting. It also indicates the mutual choices, in which pupils choose each other, and it would reveal the presence of cliques, in which
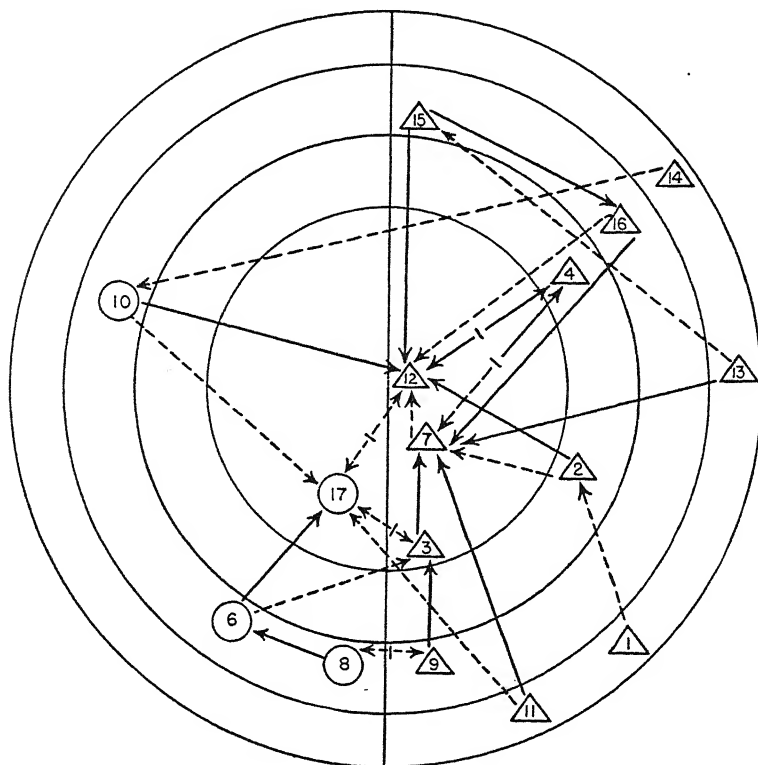
Figure 6. Sociogram: Luncheon preferences in a third grade group. The 12 boys are on the right, the 4 girls on the left. Solid lines are first choices, broken lines second choices. Arrows point to the pupil chosen; double arrowheads on the same line represent mutual choices. (Urie Bronfenbrenner, "The Measurement of Sociometric Status, Structure and Development," *Sociometry Monographs*, No. 6., New York: Beacon House, 1945, p. 38. Reproduced by permission. The figure is drawn from data in Willard C. Olson, "The Improvement of Human Relations in the Classroom," *Childhood Education*, vol. 22, March, 1946, 317–25, Table 1. Various refinements of the sociometric technique are elaborated in this monograph.)

the choices are largely among members of a subgroup. When the sociometric technique is applied to the same group a year or so later, it will be found that many pupils have changed places, some moving

toward the center and some toward the fringe, while the constitution of cliques will often show a change, perhaps breaking up and reforming with a different membership.

Aspiration Level. Some fortunate individuals are content with their rôles and status. Their level of aspiration is the same as that of their achievement. But interesting phenomena appear when there is a divergence. If the aspiration level is but a little higher than achievement, the individual may be motivated to improve. If it is considerably higher, though he may continue to strive with his "wagon hitched to a star," he is more likely to be discouraged with continued failure, to become discontented, critical, and antagonistic, and to develop undesirable behavior symptoms. If, on the other hand, his capacity is higher than his aspiration level, he puts forth little or no effort, and as a result may be a failure even where he might easily have succeeded. The teacher can help pupils to set their levels of aspiration at reasonable points and encourage them thus to attain their goals.

Leadership. The rôle of leader carries with it recognized status and prestige. In a democracy, in which the leaders do not come from an hereditary nobility, some schools have felt it incumbent upon themselves to train all pupils for leadership, a project which if successful would result in an anomaly, since there would be no followers. Recognizing this, as well as the impossibility of training all for leadership, the duties of "followership" have been recognized. However, evidence from the study of spontaneous social groups seems to show that neither needs so much to be taught as to be given an opportunity and to be guided. The first task is to improve the social view and outlook of those of leader status, and to acquaint them with the duties and responsibilities of leadership. The second task is to bring out the leadership qualities of those with knowledge and talent of a special kind which give them prestige and qualify them to assume leadership in particular situations. Illustrations of the latter might be cases in which a more modest and retiring pupil would be accepted as a leader on a hike if he knows the trails, or in a shop or musical organization if he has developed special skills. In both tasks, the actual experience of leading, with its specific duties and responsibilities, is important if the child is to acquire leadership qualities, as is a respect for talent and training on the part of the followers. With these beginnings, the pupil can gradually be inducted into the more complicated phases of group leadership.

Social Achievement. The success of pupils in their academic perform-ance is estimated in terms of school marks and measured by standard-ized achievement tests. Their success in making social adjustments, in participating in group action, acquiring status and prestige, and in developing leadership qualities, cannot so readily be stated in quantita-tive terms. Three techniques are commonly used for this purpose: rating, the behavior journal, and time sampling.

The rating technique is very commonly employed at all levels. Stu-dents and teachers are frequently rated, and the latter are sometimes called upon to rate their pupils according to certain traits. In order to keep such ratings from being unreliable, and revealing more of the rater's prejudices than they do of the characteristics of the ratee, certain cau-tions must be observed:

1. *Definition.* Define the traits to be rated. If a teacher, or any other individual, is to be rated, say for cooperation, it is necessary for the raters to agree on what cooperation is, at least with respect to the situation being considered. Otherwise, one rater might think of coopera-tion with pupils, another with colleagues, and a third with administra-tion. One might think of it as meaning subservience; and another, initiative. It is well to agree upon a list of things that a person would do if he were characterized by the trait in question. Such performances are called *trait actions*.

2. *Zero point.* Determine the meaning of zero and perfect scores in relation to the class or "bracket" with which the individual is to be compared. It should be determined whether a zero rating means none of the quality at all, the lowest in the experience of the rater, the lowest recalled for that particular grade or class level, or the lowest in the group at the time. The same conditions hold for the high or perfect ratings.

3. *Intermediate points.* Provide enough intermediate points between the high and low, but not too many. A five- or six-point scale allows the rater to avoid rating too many individuals at the top or bottom and at the same time provides enough points to differentiate individuals between these two extremes without making the differentiation so fine as to be unworkable. It is often desirable to give brief verbal indications of the meaning of some of the intermediate points on the scale.

4. *Raters.* Use competent raters. Three constitute an absolute mini-mum for anything but a self-rating, while an average of the ratings of five or seven is desirable. Furthermore, the raters must know very well the individual to be rated, especially in connection with the kind of situation in which he is to be judged. Some teachers are "bearish" in

class but very sweet outside, and some pupils are models of deportment in class and bullies on the playground.

5. *Halo effect.* Guard against the influence of the so-called halo effect. It sometimes happens that if a rater likes or admires a ratee, all his ratings will be more favorable—intelligence, appearance, cooperation, or whatever is rated—while, if he strongly dislikes him, the ratings on all traits are likely to go down, even on those in which he actually excels.

6. *Total score.* Set little store by any total of numerical values which may be assigned arbitrarily to the ratings. It may be that a person who is high on a number of traits is better than one who is not so high. But one deficiency may be so serious as to nullify any advantage in the grand total.

Ratings may be made in a number of ways—by descriptive words, by the letters A to E, which are used quite regularly as a scholarship marking system, by numbers, 1, 2, 3 . . . , and by the use of lines. When the latter method is employed, the instrument is called a *graphic rating scale*. It has many advantages and is quite frequently used. It provides an opportunity for the individual to place a check anywhere between the main points of the scale and gives a place for descriptive phrases at these points. When the favorable end of the scale for all items is at the right, a line can be drawn connecting the rated points for several traits of any one person in order to make the personality pattern stand out more clearly. Such a graphic presentation is called a *profile*. When this is not desired, the left or right end of the scale may show the favorable qualities in order to discourage the rater from making similar judgments on all traits. Samples of items from four different kinds of rating scales are shown herewith.

(a) Rating Children[20]

Is he indifferent or does he take interest in things?

Is indifferent Unconcerned	Uninquisitive Rarely interested	Displays usual curiosity and interest	Interests are easily aroused	Has consuming interest in almost everything

(b) Rating Teachers[21]

Is he tactful or tactless?

Always rubs people the right way Extremely tactful	Seldom makes a break	Indiscreet	Makes irritating and antagonizing remarks Hurts people's feelings

[20] M. E. Haggerty, W. C. Olson, and E. K. Wickman, *Behavior Rating Schedules,* Yonkers-on-Hudson: World Book Co., by permission. Copyright 1930 by American Council on Education.

[21] Max Freyd, *Graphic Rating Scale for Teachers,* Chicago: Stoelting, 1923.

(*c*) Self-Rating Scale for Supervisors[22]

I have few or no unpleasant mannerisms.

	P.	F.	Av.	V.G.	S.

Do I appear calm, poised, and dignified?

Do I look at people when talking to them?

Am I pleasant, cheerful and agreeable?

Do I make teachers and pupils feel my interest?

Do I consciously try to correct unpleasant mannerisms mentioned to me by others?

(*d*) Diagnostic Rating Scale of Instructional Activities[23]

Types of Criticism

——*a*. Pupils indifferent to general class criticism.

——*b*. Pupils resent criticism offered.

——*c*. Many pupils are stimulated to improve by criticism.

——*d*. Criticism may be constructive or destructive depending upon the mood of the teacher.

——*e*. Pupils are stimulated by criticism and shown how to improve.

The second device for studying social adjustment is the *behavior journal*. This is a kind of diary the teacher keeps of his contacts with each pupil. He may make one or more entries a week under three heads: Event, Interpretation, and Treatment. For example:

A—said he didn't have time to do his assigned lesson; laziness; kept him after school. B—complained that she isn't popular and doesn't know why; she seems shy and yet antagonizes others; arranged conference later, asked the chairman of the decorating committee for the pageant to put her on the committee, and inquired into home conditions which may be responsible. C—brought in a poem he had written and asked what I thought of it; shows literary talent; suggested he submit it to the school paper.

It is clear that with twenty or thirty entries running through a school year on each pupil a rather complete picture can be obtained of his difficulties, weaknesses, and accomplishments as they come to the atten-

[22] E. J. Brown, *A Self-Rating Scale for Supervisors, Supervisory-Principals, and Helping-Teachers*, Bruce, 1929.

[23] T. L. Torgerson, *Diagnostic Teacher Rating Scale of Instructional Activities*, Bloomington: Public School Publishing Co., 1930.

tion of the different teachers. Such a journal record furnishes valuable help for later understanding and guidance. It is sometimes argued that the record is unfair to the pupil because he has a right to come to a new teacher with a clean slate. But this shows a misunderstanding of the situation. Favorable as well as unfavorable teacher contacts should be reported; and, furthermore, unfavorable reports are usually noised abroad orally. It is really fairer for a teacher to have the record of what actually transpired, and then try to make his treatment more successful than what has gone before. The behavior journal is more satisfactory than a rating device, at least for understanding individual pupils. However, teachers usually need instruction and practice[24] if the behavior journal is to be useful, since otherwise they are likely to make peremptory judgments. In the first example given, for instance, a pupil might be rated lazy when such an interpretation might be quite unjust. The record should show the data on the basis of which the judgment is made.

Another method of controlled observation of behavior is the *time-sampling* technique. To use this it is necessary to select some specific form of observable behavior, such as aggressiveness, cooperation, leadership, crying, quarreling, or talkativeness.[25] The observer watches each pupil in turn for a predetermined period, perhaps a half a minute or two minutes or more, and makes a check after his name in the list of names on a chart if that form of behavior appears in that time. The next day, perhaps, he does the same thing over again following a different order, checking in the second column, and so on. After fifteen or twenty such observations, a quantitative measure of that behavior item is obtained for each pupil in terms of the frequency with which it occurred. Thus it is possible to determine quite accurately the amount of aggressiveness, cooperation, leadership, and the like, which pupils show.

The records which are obtained in these and other ways are primarily to discover the amount of pupil improvement under normal or experimental conditions. Other uses which can be made of them are for reporting progress to parents, for motivation, and for educational and vocational guidance.

In Summary

Many factors influence the development of children and youth. Teachers and others who have a definite responsibility for these young

[24] American Council on Education, *Helping Teachers Understand Children*, by the Staff of the Division on Child Development of Teacher Personnel. Prepared for the Commission on Teacher Education, 1945.

[25] See W. C. Olson and E. M. Cunningham, "Time Sampling Techniques," *Child Development*, vol. 5 (March, 1944), 41, 58.

people, have little or no control over some of the factors, but they can do their work better if they know about them and realize their importance. Thus they are better able to understand behavior which otherwise might be incomprehensible, and, understanding it, they are in a better position to deal with it intelligently. Other aspects of the environment they can modify and control with a view to bringing about more effective and satisfactory learning.

Among the uncontrolled factors to be understood are the neighborhood conditions—population, race, nationality, socio-economic status, and the customs and ideals of the people. Also there are the conditions of the pupil's home, the kind of people who gave him birth and nurtured him, the ideals and pressures that have been about him. Often, when these conditions are known, the solution of individual problems becomes at once evident.

Many conditions in the community can provide valuable educational experiences, and the schools recognize that if these resources are tapped the opportunities for learning are thereby enhanced. People, organizations, and other institutions contribute to the education of the child, as well as his own clubs, cliques, and play groups, and his contacts with all these can be so arranged that he will benefit.

The school environment itself is definitely under the control of the staff. The grounds and buildings can provide healthy, satisfying living conditions that promote learning and growth. The type of organization and control, whether autocratic, democratic, or laissez-faire, establishes the field of forces which largely determines the kind of behavior that is found in the school. And a wide choice of educational experiences and opportunities for student participation are found to adapt more satisfactorily to the diversified needs of all the children of all the people than the traditional program that was set up for a select few.

The pupil's school environment consists also of other pupils among whom he must establish himself as a person, finding his rôle, gaining status, forming his attachments, and achieving the goals he has set for himself. In doing these things he needs the help of the teacher in regulating this environment, in "tempering the wind," that he may find encouragement in his efforts. The teacher's task therefore, if it is to be done well, is not an easy one. His job has been described as parent surrogate. He is guide, counselor, and friend. By means of the sociometric method, careful rating procedures, the behavior journal, the time-sampling technique, as well as in other ways, the teacher may note the effect of the previous environmental influences on the pupils and modify his treatment accordingly.

Questions

1. In what ways do you think the nature of the population in the midst of which a child is reared influences (*a*) his development, (*b*) the school program?
2. Show how differing folkways among different socio-economic groups tend to determine the treatment of an individual in a community.
3. Speculate on the attitudes held toward each other of those holding to each of the several traditional ideals.
4. How is a child from a home of low socio-economic status apt to be handicapped in school?
5. How do the problems of a school differ according as lower- or middle-class children constitute the minority group?
6. In what ways can the schools make use of other educational opportunities in the community?
7. What is meant by the following terms: ecology, blighted area, folkways, mores, class, caste, status, broken home, rejected child, security, community council?
8. Visit two or three school plants and rate them, as well as you can, charting significant items. Connect the points on the scale to form a profile. What conclusions can you draw as to improvability?
9. How can children be led to take an interest in the maintenance and development of the school plant? How can school architecture, equipment, and interior decoration add to the educational process?
10. Cite instances of autocratic and democratic administrative control in classroom procedure. What are the advantages of each?
11. What kinds of school experiences will render effective democratic participation in after-school years more likely?
12. Why does departmentalization render such an institution as the homeroom necessary? What functions may it serve?
13. Show how a child's adjustment is affected by his aspiration level. What may a pupil do to improve his status?
14. Arrange to make or review a behavior journal of some school child, during the present term, using the following three heads: event; interpretation; treatment.
15. Using the time-sampling technique, record some observed behavior of a group of pupils or students: e.g., study; aggressive behavior; solitary play; talking; tics; etc.

Readings

Bowden, A. O., and I. R. Melbo. *Social Psychology of Education.* New York: McGraw-Hill, 1937. Chapters II, V, VI, VIII.

Pages 38–44 discuss teacher prestige and personality; Chapter V, the function and techniques of pupil control; Chapter VI, the chief factors in administrative control; and Chapter VIII, public opinion and school publicity.

Northway, M. L. "A Method for Depicting Social Relationships by Sociometric Testing." *Sociometry*, vol. 3 (April, 1940), 144–150. The procedure for constructing the target diagrams is described.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology*. New York: Harper, 1937. Pp. 86–93. Report of an interesting study of leadership among preschool children.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937. Pp. 59–61; 65–66; 71–74. Selections from Sumner's *Folkways*, from Shaw's *Delinquency Areas*, and from Roper's *The City and the Primary Group*. Also selections on social control and on educational objectives and curricular modifications.

Sumner, W. G. *Folkways*. Boston: Ginn, 1906. Chapters I and II. Many will want to read farther in this volume, but in the first two chapters are presented certain fundamental notions of the folkways and of the mores and characteristics of the latter.

Thorndike, E. L. *Man and His Works*. Cambridge: Harvard University Press, 1943. Chapter X. The chapter is entitled, "The Psychology of Welfare: The Welfare of Communities," and describes in brief and readable fashion the findings of the studies of the goodness of cities.

Waller, W. W. *The Sociology of Teaching*. New York: Wiley, 1932. Chapters II, IV, IX, X, XIII, XVI. The school as a social organism, its community background, its separate culture, ceremonies, primary groups, and varieties of prestige and disrepute.

In addition there are many valuable references on youth organizations, community relationships, and democracy in the schools.

The following serve as excellent references for youth organizations:

Chambers, Merritt M. *Youth-Serving Organizations: National Nongovernmental Associations*. Washington, D. C.: American Council on Education, 1941. Purposes, activities, financial support, services rendered, relations with the school, etc., of a wide variety of associations.

Pendry, E. R., and H. Hartshorne. *Organizations for Youth*. New York: McGraw-Hill, 1935. A directory of 40 societies with their histories, philosophies, and programs.

Pierce, B. L. *Citizens' Organizations and the Civic Training of Youth.* New York: Scribners, 1933.
Results of a study of over 200 organizations influencing patriotism, loyalty, and the ideals of citizenship.

The following deal with various aspects of community relationships:

Eckert, Ruth E., and Thomas O. Marshall. *When Youth Leave School.* New York: McGraw-Hill, 1938.
Educational Policies Commission. *Education for* All *American Youth.* Washington, D. C.: National Education Association, 1944.
Educational Policies Commission. *Education for* All *American Children.* Washington, D. C.: National Education Association, 1948.
Kolb, John H., and Edmund de S. Brunner. *A Study of Rural Society: Its Organization and Changes.* Boston: Houghton Mifflin, 1940.
Michigan Council on Adult Education. "Organizing a Community Council." (Bull. No. 330.) Lansing: Superintendent of Public Instruction, 1944.
National Education Association and American Association of School Administrators Educational Policies Commission. *Social Services and the Schools.* Washington, D. C.: The Commission, 1939.
Olsen, Edward G., and others. *School and Community: The Philosophy, Procedures and Problems of Community Study and Service through Schools and Colleges.* New York: Prentice-Hall, 1945.
Olsen, Edward G. (Ed.) *School and Community Programs.* New York: Prentice-Hall, 1949.
Prall, Charles E. "Community Organization and Cooperation." In *Toward a New Curriculum. (Seventeenth Yearbook.)* Washington, D. C.: Department of Supervision and Curriculum Development, National Education Association, 1944. Pp. 141–168.
Zimmerman, Carle C. *The Changing Community.* New York: Harper, 1938.

The following elaborate the meaning of democracy in the schools:

National Education Association and American Association of School Administrators Educational Policies Commission. *Learning the Ways of Democracy: A Casebook of Civic Education.* Washington, D. C.: The Commission, 1940.
Pistor, Frederick. "A Standardized Measure of Classroom Democracy." *Journal of Educational Research,* vol. 35 (November, 1941), 182–192.
Ragan, William B. "Education Suited to a Democracy." *Educational Administration and Supervision,* vol. 31 (March, 1945), 149–156.
U. S. Office of Education, Federal Security Agency. *Living Democracy in Secondary Schools. (Education and National Defense Series,* Pamphlet No. 7.) Prepared by A. Laura McGregor in coöperation with the

U. S. Office of Education. Washington, D. C.: Government Printing Office, 1942.

U. S. Office of Education, Federal Security Agency. *What Democracy Means in the Elementary School.* (Education and National Defense Series, Pamphlet No. 6.) Washington, D. C.: Government Printing Office, 1942.
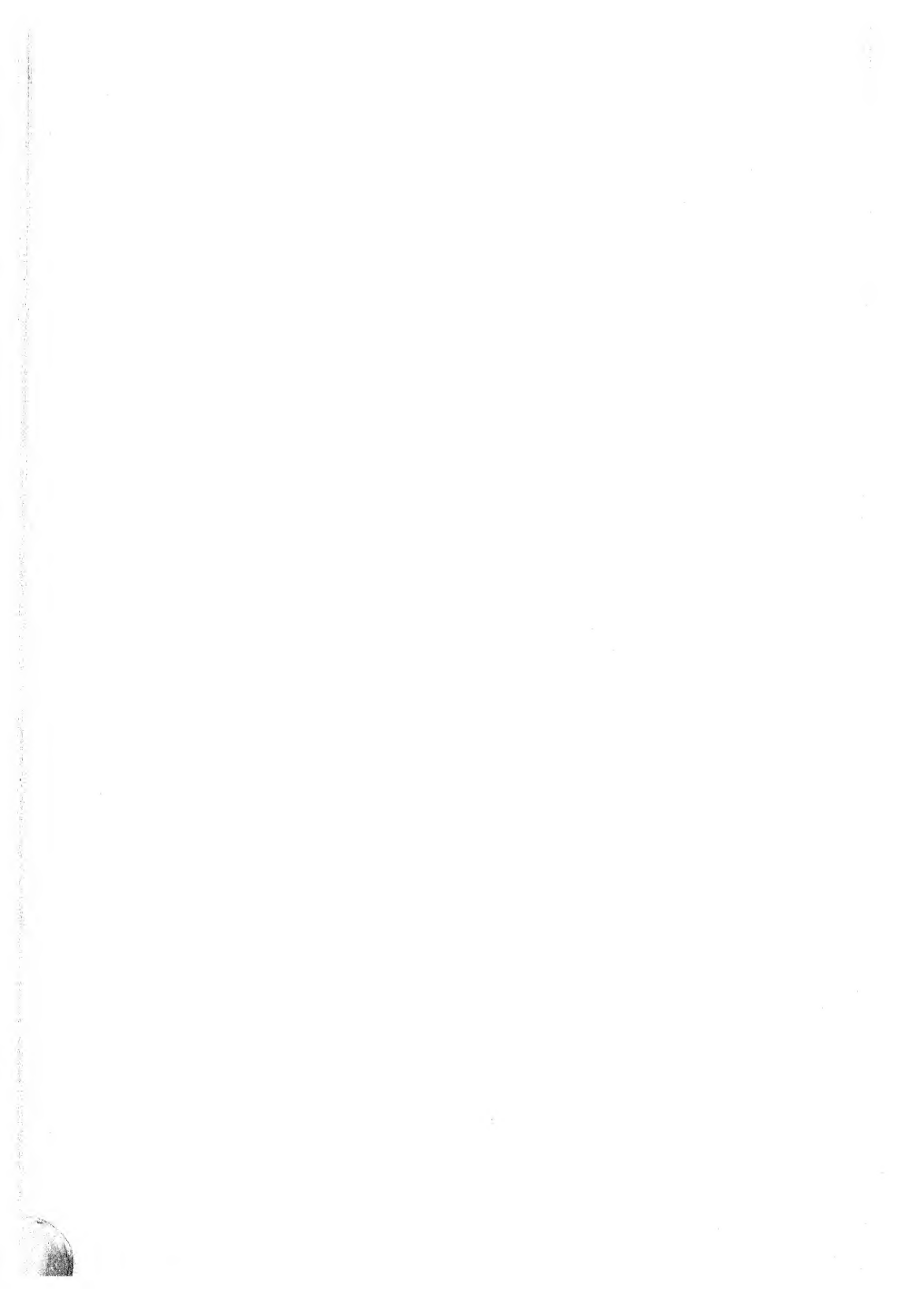
Adjustment and Guidance

STUDENTS and teachers alike live in a physical and social environment that influences their behavior in various ways. Their reactions to certain of its aspects are now to be considered. Answers will be sought to such questions as the following: What are the characteristics of the responding organism? How do people come to behave as they do? Can we understand them better if we know something of the nature of their interests and attitudes, of their habits, drives, and needs?

Children, and adults too, do not always behave rationally. Instead, they sometimes react emotionally, and some develop peculiar symptoms and even become insane. They try to avoid being blamed, to escape from difficult situations, and to have their way at all costs. Such behavior is often judged as right or wrong according to certain moral standards. Some of it, however, is judged as evidence of health or illness. In both cases, the task of society, working through the school and other agencies, is to provide a wholesome environment in order that all may learn to respond in more satisfactory ways, and to provide correctives where necessary.

If one understands children, he knows about their environmental background and also about the way they respond to it as they develop. And he can therefore see in their individual responses, in their enthusiasms and evasions, in their chance remarks, and even in their facial expressions, evidences of general underlying conditions that may call for a different kind of treatment than their responses alone would suggest.

Motivation

How Are Pupils Motivated? Perhaps the most difficult problem that a teacher has to face, whether as activity director, instructor, or case worker, is that of pupil motivation. What are the reasons for an interest (or lack of it) in school activities, daily lessons, or, more generally, in working toward commonly accepted life goals? Obviously, there is no such thing as "general interest in school" of which each pupil has a certain amount; for a disinclination on the part of a pupil in one direction does not necessarily imply a lack of enthusiasm in others. The most lackadaisical boy in class may be an athletic hero or a cheer leader, not only highly energized himself, but stimulating others to frenzied enthusiasm. Why does he devote himself to these activities and not to his school work? And why do other pupils work hard at something else— their lessons, their clubs, their music, their social activities, or perhaps at making themselves as troublesome as possible?

The search for answers to such questions as these leads to a consideration of motivation as it applies not only to the pedagogical problem of interest in school subjects but also to the fundamental nature of human beings—their attitudes and needs, and their varied ways of finding satisfaction.

1. Approach and Avoidance

Pleasantness and Unpleasantness. Practically all experiences are affectively toned, that is, with the exception of those that may be called indifferent, they are pleasant or unpleasant in varying degrees. This is particularly true of sensory experiences. Children, as well as adults, prefer certain colors, sounds, smells, and tastes. Such words as bright, colorful, harmonious, and sweet, as contrasted with dull, drab, harsh, vile, and painful, testify to the distinction. There are, of course, differences in personal taste, for some things that are pleasant to some people

are unpleasant to others, though there is still considerable agreement. But memories are also pleasant or unpleasant, as are imaginings, thoughts, and overt experiences.

It is customary to assume that mankind and also the lower animals are motivated entirely by pleasantness and unpleasantness and are almost constantly struggling to attain the one and avoid the other. Indeed, it seems quite obvious that a pleasant condition or state of affairs produces approach responses, and, conversely, that the unpleasant produces avoidance responses. However, if certain aspects of an environmental situation in which an individual is involved are affectively pleasing, tending to produce approach responses, and other aspects are affectively displeasing, tending to produce avoidance responses, a kind of conflict appears. Illustrations of such a conflict would be trying to sleep in an uncomfortable bed, plucking a thorny rose, or listening to a good orchestra while people near-by are talking and whispering. The situation has both pleasant and unpleasant aspects.

But people sometimes approach or seek out what is affectively unpleasant and avoid what is affectively pleasant. They do this because, as one might say, "it gets them what they want." They submit to painful operations, or go through gruelling athletic practice, because they want to be well again, or make the team. And they refrain from eating tasty food because they are allergic to it, or decline appealing invitations because they have work to do. Of course, it can be argued that this seeking of the unpleasant is in reality but a special case of the conflict already noted, the more pleasant state of affairs, such as health or success in play or work, although not present at the moment, is still a part of the same pattern. Hence, one could contend that what all individuals seek is pleasure, even the most austere who get satisfaction out of their very austerity, or perhaps look forward to a later reward.

Hedonism is the name given to the theory that all human striving is fundamentally a pursuit of pleasure (or an avoidance of pain), whether it is one's own or is broadened to include the greatest good of the greatest number. The hedonistic view of life has many ramifications. There is ethical hedonism, for example, which is the doctrine that pleasure is the chief good, whether of the senses or of the mind.

From the psychological point of view, however, if pleasant conditions or states of affairs are the things sought, the way to motivate people is to make what they are expected to seek as pleasant as possible. Thus, on the basis of this theory, supposedly, the way to make children want to learn is to make the process pleasant for them; hence the so-called

"sugar-coating" of the bitter pill of learning, including some of the practices advocated in the name of progressive education.

In supporting such a program, however, there is danger of what is called circular reasoning. If it is assumed and postulated that people act so as to attain pleasant (and avoid unpleasant) feeling, any stimulus situation to which an individual responds positively would by definition have to be called pleasant, and any to which he responds negatively would have to be called unpleasant. If positive responses are sought, the problem of motivation properly becomes not one of finding affectively pleasant stimuli but of finding those stimuli which produce the desired responses whatever their actual affective tone may be.

Satisfiers and Annoyers. Children may be observed to move toward some objects in their environment and away from others. If the question is waived, then, as to the affective tone produced, and attention is given to their behavior only, the significant element in the situation will be emphasized, leaving the answer to the question *why* they respond in this way to be determined later. This makes it convenient to have a different set of names. Those objects in their environment which people move toward, we have noted, are said to have *positive valence,* and those they move away from, *negative valence.* The term valence, or "demand value," is used to apply to that characteristic of certain objects or situations that produces approach or avoidance behavior in individuals. Children tend to approach such things as toys, candy, playmates, parents, or teachers who are calling to them to come, and the like, and to move away from persons or events that threaten or frighten them or that they dislike, as, for example, older children who bully them, or foods or tasks which are distasteful. The positive responses may consist of actually running toward the stimulus, or merely of staying in the neighborhood of it, or of acting in such a way as to bring it closer that it may be responded to in appropriate ways. Similarly, the negative responses may consist of actually running away from the stimulus, or refusing to respond to it in appropriate or expected ways, or of acting in such a manner as to push or keep it farther away.

Obviously, the same object will in many cases be approached at one time and avoided at another according to the circumstances. For example, a child may become tired of playing with a toy or may have had enough food. Such a condition is known as satiety or satisfaction. A *negativistic* stage is one in which a child avoids, rejects, or declines to respond in supposedly appropriate ways to objects which oversolicitous teachers or parents press upon him. In early childhood, negativism is a sign of devel-

oping independence which, though it may be annoying to those who demand compliance, yet should be viewed as a good sign; for it shows that the child is becoming a person in his own right. Later his choices become more discriminating, and his refusal to eat or to play and the like will be apt to develop into more socially approved ways of avoidance.

Thorndike has called situations resulting in positive responses, *satisfiers*, and those resulting in negative responses, *annoyers*. He defines a satisfier or a satisfying state of affairs as one which the individual "does nothing to avoid, often doing things which maintain or renew it."[1] Conversely, an annoying state of affairs is one which the individual avoids or changes.

Responses of approach and avoidance are, of course, not confined to young children. In fact, all situations with the exception of those to which individuals are indifferent could be classified as satisfiers or annoyers. Some of these which are commonly found in school situations are listed below.[2] It is interesting to note among the satisfiers some of the behavior that teachers have to control, much of which is worked off on the playground, and among the annoyers some of the behavior that unskilled teachers employ to maintain control.

Satisfiers

1. (*a*) Muscular activity, after deprivation, (*b*) muscular inactivity, after abundant exercise

2. (*a*) Struggling with an animated opponent, (*b*) clutching it, throwing it down, (*c*) being on top of it, (*d*) shoving it aside, (*e*) escaping from its clutches

3. (*a*) Receiving favorable attention, (*b*) humble approval from any person; admiring glances and sounds, smiles from those above one in mastery-status, (*c*) friendly behavior

4. (*a*) Submissive behavior of others when one is set toward mastery, (*b*) submissive behavior of oneself when one is set toward submission.

5. (*a*) Attaining before others do a goal which they seek, (*b*) pulling toward oneself an object which others are trying to pull toward themselves, (*c*) holding what others are trying to take away from one, (*d*) getting the attention of one whose attention others are trying to get, (*e*) other successes in instinctive rivalry

6. (*a*) Seeing and hearing children laughing, gurgling, cooing, crowing, smiling, snuggling, (*b*) giving bits of food to a child or animal and seeing it eat

[1] E. L. Thorndike, *The Psychology of Learning*, New York: Teachers College, Columbia University, 1913, p. 2.

[2] E. L. Thorndike, *Adult Interests*, New York: Macmillan, 1935, pp. 177–180. Used by permission of the publishers.

7. A feeling of security and confidence, often aided by (*a*) being in familiar surroundings after deprivation therefrom; (*b*) the company of familiar persons; (*c*) "being in a sheltered nook open on only one side"; especially having something solid behind one

8. Curious examination, manipulation, and dismemberment of objects

Annoyers

1. (*a*) Muscular activity when weary, (*b*) muscular inactivity when craving exercise

2. (*a*) Being interfered with in one's movements by being held, opposed, pushed, etc., (*b*) being thwarted in any original tendency, (*c*) being confined in a small inclosure

3. Being seized or slapped

4. (*a*) Being neglected, (*b*) scorn; derision

5. The perception of another getting attention, affection or approval which one craves for oneself

6. Large objects advancing toward one violently

In addition to the satisfiers and annoyers that are fairly common to mankind, individuals have their own personal likes and dislikes, their "pet peeves." A number of these have been collected and include all the diversity of human taste from peppermint candy to a democratic form of government.

2. Interest

Interests. Satisfiers that produce continued positive responses are referred to as interests. Interest itself is a kind of mental excitation or preoccupation with certain classes of objects or situations. These may involve persons and relationships among them, or things and the way they are put together or connected. The interest may be largely intellectual, and it may be mildly or intensely emotional. The interest of a person is evidenced when he thinks about or inquires into conditions, manipulates objects, or takes part in or carries forward activities appropriate to his interest. Thus a child likes (or dislikes) baseball, the movies, or the study of history, meaning that he chooses (or does not choose) to spend time playing baseball, going to the movies, or studying history, and so on.

Certain characteristics of children's interests are of special importance to the teacher. One of these is their *breadth*. Children are interested in a wide variety of things, often being intensely interested in most diverse kinds of experience. Another characteristic is their *flexibility*. Children can readily adapt to what happens to be in their environment, often

finding satisfaction in the most unpromising equipment, enjoying "playing with" whatever happens to be around. If there is a wider selection, choices seem to be made often by chance—what a friend of theirs is doing, for example.

A third characteristic is their relationship to *ability*. Continued preoccupation with certain kinds of relationships and experience in dealing with them naturally lead to increased knowledge and skill. And continued success and satisfaction with one's efforts may imply real talent. On the other hand, pupils may express an interest in something they know little or nothing about. Vocational counselors are occasionally misled by an expressed interest on the part of a pupil for a particular kind of work that may have a prestige value, when the pupil has no real acquaintance with it, no capacity whatsoever for it, and possibly no expectation of doing it. On vocational interest blanks pupils are sometimes directed to indicate the kind of work they "would like to do," without regard to their skill, ability, or training. Thus they are instructed to make a fantasy choice.[3] If such choices are so regarded by vocational counselors, they may serve as an indication of the general direction in which a pupil's vocational preparation might lie, but they cannot properly be regarded as an indication of the vocation he should choose, or even of his own real vocational choice.

A fourth characteristic of children's interests is their relative *constancy*. Some children maintain a definite artistic, musical, mechanical, or social interest over a long period of years. However, others range through a variety of interests that seem to lack continuity. Hence, successive tests of the same children by the use of interest questionnaires may show that after a year or two, half of a group of children will be interested in something seemingly quite different from what attracted them previously.

Childhood and youth are periods of exploration in which contact with all kinds of conditions is established, and an acquaintance is made with many phases of the environment. Exclusive application to a single phase would make for narrowness, and for a lack of understanding, and of a fully rounded development. Furthermore, if it were impossible to interest a child in anything that was not "his interest," he would be a difficult pupil to teach many of the things he should know for his own good and for that of others.

Measuring Interest. The most widely used instrument to inventory interests is that developed by Strong, which "measures the extent to

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[3] W. C. Trow, "Phantasy and Vocational Choice," *Occupations*, vol. 20, No. 2 (November, 1941), 89–93.

which one's interests agree or disagree with those of successful people in a given occupation."[4] There are two forms of the blank, one for men and one for women. The blank contains 400 items on which a preference may be stated, including a like-indifferent-dislike choice of occupation, amusements, activities, personal peculiarities, and school subjects, as well as paired comparisons for checking preferred work habits, abilities, and characteristics. The scoring technique permits a classification of an individual according to occupations, seventeen for women and thirty-four for men, and (by the use of "group keys"), according to six large occupational groupings.

Another instrument, developed for experimental purposes, calls only for a like-indifferent-dislike choice, but for a large number of activities relating to school and out-of-school life.[5] This test is scored for a number of categories as follows: acceptance of own impulses, severity with oneself, relationship with family, identification with others, relationship with same or opposite sex, solitary activities, aggression, fantasy, mystery, magic, humor, preoccupation with cleanliness, methodical activities, life-death universe, school and out-of-school activities, dramatics, leadership, and authority.

From this list it can be seen that the forms are used to inventory interests as an indirect means of personality description. The results form not a score but a profile of the various items in which a pupil is strong, reflecting a pattern of basic aims and desires, and indicating the nature of his social adjustment.

On another type of interest questionnaire, the Kuder Preference Record, the questionee is asked to indicate which of two activities he prefers or would prefer.[6] Three hundred such pairs of choices are presented, such as the following:

Which would you rather do—

A. (1) Visit an art gallery
      (2) Attend an auction
B. (1) Study algebra
      (2) Study a foreign language
C. (1) Help organize surveys of public opinion
      (2) Interview people in surveys of public opinion
D. (1) Be a lawyer
      (2) Be landscape architect

[4] E. K. Strong, Jr., *Vocational Interest Blank* (rev. ed.), Stanford University: Stanford University Press, 1938.

[5] G. V. Sheviakov and J. Friedberg, "Use of Interest Inventories for Personality Study," *Journal of Educational Research*, vol. 33 (May, 1940), 692–697.

[6] G. F. Kuder, *Preference Record*, Chicago: Science Research Associates, 1939.

As these examples show, the questions relate to in-school and out-of-school work, and intermingle questions relating to experiences pupils may have had with others that they cannot possibly have had. Their preference must mean something in the latter case, but just what, it is hard to say. The innovations in this questionnaire are the paired-comparisons form, the ingenious arrangement of the questions for scoring, and the set of categories into which the results are combined. Under each category the author lists "some of the occupations which might be brought to the attention of the student with a high score in that field." The categories are listed below with a few samples of the occupations given:

1. Scientific activities: chemist, physicist, criminologist, electrical engineer, surgeon, etc.
2. Activities involving computation: accountant, statistician, mathematician, bond salesman, etc.
3. Musical activities: singer, music critic, sound engineer, etc.
4. Artistic activities: artist, art critic, photographer, architect, hairdresser, florist, etc.
5. Literary activities: author, editor, poet, actor, proofreader, librarian, etc.
6. Social service activities: psychiatrist, dean, missionary, kindergarten teacher, sociologist, etc.
7. Persuasive activities: salesman, lawyer, consul, buyer, bill collector, labor leader, etc.

The author points out that these lists may have to be revised, and any counselor would, of course, take other matters into consideration in giving advice, including intelligence and school achievement in the areas where the high interest scores are found. However, students who have chosen training in medicine, business and accounting, writing, social service, and political science, for example, were found to be high in scientific, computational, literary, social service, and persuasive preferences respectively.

The vocational counselor can undoubtedly find assistance in one or another of the interest questionnaires, since they suggest possibilities that neither he nor his conferee might think of. But he must realize that their suggestions are quite general, and that interest and talent in a particular activity are two quite different things. In matters of educational guidance, the same difficulties present themselves, and, in addition, the personalities and methods of the teachers of various courses constitute variables.

Some teachers have the knack of making almost everyone like the courses they teach. One girl "didn't like" history, but was for some reason enthusiastic about costume design; so the teacher found some volumes on period costumes which awakened the child's interest in what was going on in the history class. A boy didn't like arithmetic, but did like work in manual arts so, in cooperation with the shop teacher, practical examples in shop mathematics were introduced.

Interests derive from one or more of three conditions. One is the basic inherited nature of the organism, in which they are akin to original satisfiers. The second is from rewarded experiences connected with certain activities and not with others. In this respect they are acquired. People say, for example, that they learned to like olives, or Latin, or modern music. Obviously, it is the teacher's job to help pupils like subjects and activities, for when this is done the problem of motivation largely disappears, though it is hardly to be expected that pupils can be taught to like all the subjects in the curriculum. The third condition from which interests derive is one of need. Just as the hungry man is interested in food, so from the complexities of the total environment certain objects or conditions are sought which satisfy a need, perhaps vaguely felt, perhaps definite and explicit. Different kinds of needs will be discussed later in this chapter. But first, the nature of attitude will be considered, for this is of fundamental importance not only in its effect on the approach of pupils toward their school work, but also in its bearing on the relationships between pupils and teachers, and their adjustments to life problems.

3. ATTITUDE

Characteristics of Attitudes. If George is interested in baseball, he will be likely to play that game rather than some other. He will attend college and league games if possible, listen to the reports over the radio, and follow the scores and batting averages in the newspapers. His father, however, may not be thus interested in baseball, though he may have a favorable attitude toward it. He knows that many like to play the game or watch it, and it is his opinion that they should be allowed to enjoy themselves that way if they want to. If solicited, he might even contribute to a movement to have the school playgrounds open during the summer, that neighborhood groups might use them.

Thus an attitude is a state of readiness, either mental or emotional or both, for some kind of action when the appropriate situation is present. The word may apply to the physical posture of an individual, an immediate readiness to go into action, as when one may exhibit an alert, ex-

pectant, or determined attitude; but this concept is better referred to psychologically as set, which is discussed in the next section. The term, attitude, can then be reserved for a general readiness to act in certain specific ways that are basically those of approach or avoidance. Concerning interests, one asks, "Do you like it—or dislike it?" For attitudes, the corresponding question would be, "Are you for it—or against it?"

The *object* of an attitude may be a thing, a person, a group of people or their activities, or a concept, or proposition. Whichever it may be, there is always a standard or norm involved. One may have a favorable attitude toward a picture, but he would not hang it in his home; or toward a pupil, but he would not recommend him for president of the student body. One's attitude toward a minority group, whether racial, political, or religious, would be favorable or unfavorable according to some such *point of reference*.[7] For example, one might have a favorable attitude toward a political party but still not contribute to its campaign fund or even vote for all its candidates. Around the turn of the century, there were many who no doubt were in favor of women, but not to the extent of giving them the vote! One might be in favor of mathematics but not want to take another course in it, or of a gym class if he could get excused from it.

The point of reference is a kind of zero point on a scale that extends from that point in both directions. And the point is at different places for different people and changes over a period of time for any one person. However, in many matters, such as attitudes toward popularity, wealth, and goodness, and in the school toward good scholarship, cheating, and good sportsmanship, the point is practically the same for all members of a group. Any one can, as a rule, find like-minded individuals with whom he can share his enthusiasms or air his grievances. Such a group has an underlying basis of agreement or *frame of reference*. And it is able to maintain itself through the like-mindedness and cooperation of its members. This applies not only to cliques and clubs but to religious, industrial, and political groups as well. An extreme illustration is the Nazi organization, which was built up on the basis of racial superiority, the disregard for the rights of the individual, and the hatred of other national and racial groups. These attitudes were inculcated by every means that education, propaganda, and oppression had at their disposal.

Thus various groups of people have attitudes that tend to form recognizable patterns. The scientific attitude is made up of the set of attitudes ascribed to scientists, favoring free inquiry, objective scrutiny, delayed

[7] Muzafer Sherif and Hadley Cantril, "The Psychology of Attitudes," *Psychological Review*, vol. 52 (November, 1945), 295–319, and vol. 53 (January, 1946), 1–24.

judgment until the facts are in, and verification, in opposition to superstition, obscurantism, and biased and snap judgments. Similarly, social and antisocial attitudes are characteristic respectively of those who hold their fellow men in esteem and those who do not. Likewise, cynical, pessimistic, liberal, fundamentalist, artistic, and other such attitudes are those favored by the respective groups. Since the groups are seldom well defined and are made up of many and different elements, there is naturally some divergence of opinion as to what should be the attitude of group members toward specific conditions. Strong authoritarian groups, however, define clearly what should be the attitudes of their members, enforcing them by argument, propaganda, and punishment.

Whether they are shared or are individually held, all attitudes are *selective*. A certain aspect of the object, whether a thing or person, a group or a concept, will be selected and emphasized while others are neglected. Shabby clothes or a suave manner, for example, may predispose one unfavorably or favorably toward a person whose other characteristics may be more significant. A surface politeness may cover a lack of the respect for others from which true courtesy springs. A favorable attitude toward correctness in written and oral speech might develop an unfavorable attitude toward those who have not acquired these linguistic skills, but whose virtues or accomplishments may be superior.

Attitudes *spread* from their immediate object to related aspects of the total situation. A pupil's unfavorable attitude toward a teacher is likely to transfer to what is taught, and perhaps to the school program, while a teacher's attitude toward a supervisor may color his whole view of teaching. Negative attitudes toward certain kinds of conduct of an individual or a group may spread to include the individual or the whole group; and, conversely, one who performs acts that are favored may as a person be more generally applauded than he deserves. A teacher's attitude toward "impertinence" may spread to children who are impertinent, and his attitude toward politeness may likewise spread to children who are polite. Both kinds of children have many other characteristics that are more important.

The same danger of spread and over-inclusiveness applies to groups. A child brought up with favorable attitudes toward a racial or nationality group, or an organization, be it ecclesiastical, political, or social, will sometime discover that the idols have feet of clay. Or he may discover that he is favorably disposed toward some persons in a group or some phases of its program which he had been brought up to abhor, like the child nurtured in a rigid religious environment who met a celebrated agnostic and was surprised to discover that he didn't actually have horns.

It is essential in a democracy that the school make every effort to uproot such over-inclusive attitudes, especially when they are made on the basis of nonessentials, and in their place teach favorable attitudes toward all individuals and groups, and unfavorable attitudes only toward the things that individuals and groups do that are harmful to their own best interests and inimical to the general welfare.

Another characteristic of attitudes is that the object is seldom perceived for what it is alone, but in addition there is the observer's *interpretation of the object*, what he imagines is connected with it, his evaluative judgments, and the like. This is particularly true of teachers' attitudes toward children and constitutes the basic reason for separating the "event" and its "interpretation" in a behavior journal. Unfavorable teacher attitudes create unfavorable pupil attitudes, and when these are found there is little advantage in trying to "motivate" until they are somehow corrected.

Measuring Attitudes. The investigation of attitudes began to get a real start following the publication by Thurstone and Chave in 1929 of a scale to measure attitude toward the church.[8]

The scale consists of a number of statements for and against the church as an institution, ranging all the way from: "I regard the church as a monument to human ignorance," through "Sometimes I believe the church is worth while, and sometimes I doubt it," to "I think the church is a divine institution, and it commands my highest loyalty and respect." The statements are listed in a random order, and the testee is requested to check the ones with which he is in agreement. Since each of the twenty to twenty-five statements that appear on most of the scales has a previously determined value on a scale ranging from 0 (opposed) to 11 (in favor of), the median or middle-scale value of the items checked is considered the attitude of the testee.

In constructing such an attitude scale, all possible statements ranging from one extreme, through neutral, to the other extreme are selected, and each is written on a separate card. A large number of persons serve as a jury to decide where each item belongs on the scale, each one piling the cards containing the statements on one or another of eleven piles representing the eleven scale points. Those statements are eliminated which show too wide a scatter, and which for other reasons are unsatisfactory.

A large number of scales have been developed, including those for attitude toward war, democracy, the nursery school, the Chinese, and

[8] L. L. Thurstone and E. J. Chave, *The Measurement of Attitude,* Chicago: University of Chicago Press, 1929.

so on. With these instruments it is possible to determine with considerable accuracy the immediate and long-time effect of educational or propagandistic stimulation. For example, children who were shown a motion picture film involving the machinations of a diabolical Chinese changed notably in the direction of the unfavorable end of the scale, while another group that was shown a film which represented the Chinese in a favorable light showed a change in the opposite direction. However, after a few weeks, the median scores of each group were found to have regressed markedly toward their original position.

Generalized attitude scales have been developed that simplify the process of surveying attitudes considerably.[9] Some of these may be used to measure attitude toward any disciplinary procedure, any institution, any national or racial group, any school subject, any teacher, and any vocation.

Opinion Surveys. Opinion has been defined as a statement of belief in regard to some matter, a belief not so strong as a conviction but stronger than an impression. Psychologically, an opinion is a verbalized attitude. It may have any degree of strength. For example, one may have a mildly favorable attitude toward nursery schools that practically amounts to indifference. In such a case, his opinion might be expressed by the statement, "Nursery schools are probably a good thing." On the other hand, he might have a strong attitude for or against a certain political party.

Various means have been employed to find out what people's opinions are, with a view to determining what administrative policy should be pursued. Monarchs of old are reported to have disguised themselves as peasants or commoners and mingled with the crowd to hear how they were regarded. Spies, informers, and "stooges" have been used for the same purpose. In democracies, elections in small groups or on a larger scale are commonly used to obtain a consensus of opinion concerning the officials desired, tax policies, or other matters. Individuals and research agencies have sought to discover the trend of opinion on various matters through the use of an instrument that is coming to be referred to as an "opinionnaire" (to distinguish it from a questionnaire which includes matters of fact). One of the expected findings of such inquiries has been that certain classes of people tend to hold the same general opinions. For example, people in business favor capitalism, employees

[9] H. H. Remmers, "Studies in Attitudes," *Bulletin of Purdue University*, Series I, Vol. 53, No. 4, 1934; Series II, Vol. 37, No. 4, 1936; Series III, 1938. Also H. H. Remmers and S. E. Belle, "Generalized Attitude Scales," *Journal of Social Psychology*, vol. 5 (August, 1934), 298–312. See also R. Likert, "A Technique for the Measurement of Attitudes," *Archives of Psychology*, No. 140, 1932.

favor pay raises, and so on. However, some of the more general categories occasionally show conflicting returns. Certain farm groups have been found to be conservatives in religion but radicals in economics, and certain academic groups have a scientific attitude toward problems in their special field but quite the opposite in other matters—welfare work, for example.

The chief weakness of the methods of opinion surveying mentioned is the lack of an adequate *sampling* of people from whom opinions are obtained. The medieval monarch could talk only to a few people. Even an election may bring out only about half the voters, while a 30- to 40-per-cent return on an opinionnaire is all that can be expected without a follow-up. Since everyone having an opinion cannot usually be consulted, it becomes necessary to depend on a smaller number that is representative of the entire group. This smaller number is called a sample or sampling. The smallest and most inadequate sample is, of course, a single person, whose experience may or may not be typical. The man who decides the value of military training on the basis of its effect on him would be a case in point. A so-called *random sampling* is obtained on a chance basis—every one hundredth name on the list, for example. This method is employed on the assumption that the opinions of the sample would correspond to those of the whole group. The techniques used in *opinion polls* reduce the large numbers, not on a chance basis, but by selecting a number of people that is proportional to the total number in each subgroup—racial, economic, religious, and the like.[10] This may also be done geographically by covering intensively a certain fraction of a state or city. When interview methods are also employed, surprisingly accurate results are obtained.

It should perhaps be added that there are dangers as well as advantages in the refinements of this instrument. The politician no longer needs to keep his ear to the ground so long as he keeps thoroughly well informed on the results of opinion polls. He can easily find out what people think and what they want, but their opinions may be sound or they may be misinformed. In fact, it is the function of propaganda, when improperly used, actually to misinform, that the popular opinion may be what the leaders desire. This situation reveals very clearly the importance of a free flow of information and the responsibility of the schools in opening to their students the channels of enlightenment on public issues.

Stereotype. When an attitude is based on insufficient knowledge and is little subject to change, it is referred to as a stereotype. One does not

[10] G. H. Gallup, *Guide to Public Opinion Polls,* Princeton: Princeton University Press, 1944.

always have all the facts necessary to determine whether or not a group, a situation, or an activity is really undesirable or harmful and so decide what his attitude should be. But this seems to make very little difference in some cases. Nationality stereotypes are among the most common. Various groups of people were asked to express their opinions about Turks. They had no difficulty in doing so in spite of the fact that they had never even seen one, and when all they knew of the Turks was gained from a Hollywood version of a harem. Some attitudes may apparently be built up on the basis of the flimsiest of evidence, and the tenacity with which they are held seems sometimes to be in inverse ratio to the amount of knowledge that would be necessary for an intelligent and informed opinion.

In order to develop and take advantage of this kind of attitude, education is sometimes subordinated to propaganda. Authoritarian states have limited the intellectual experiences permitted their people by means of thought-control police, book burnings, proscribed books, censorship, and the like, and by discouraging education beyond the elementary level except for the chosen few. This process is referred to as *obscurantism* —shutting off the opportunities for free inquiry, enforcing the accepted attitudes by reiteration of clichés and slogans, and so building up the desired stereotypes. This is, of course, contrary to the principles of democracy, according to which all have access to whatever facts and ideas are available.

Prejudice. When an attitude lacks a sufficiently reasonable basis and is maintained with some degree of emotion, it is called prejudice. While people may be prejudiced in favor of an object, the term usually implies a strong negative attitude, and is most often applied to persons or groups. Race prejudice is built up like other attitudes, through experience, and is strengthened by the forces making for group solidarity and intergroup rivalry. Its selectivity is enhanced by the prepotent elements of surface appearance, and it spreads to all race members whatever their other characteristics may be. It is a highly motivating factor for group conflict but not for the improvement of learning. The overcoming of prejudice and the development of desirable attitudes is one of the important tasks of the school.

4. SET AND READINESS

Attitude and Set. Attitude has been defined as a state of readiness for some kind of action whenever the appropriate stimulation is present. Thus a person may carry around with him a lot of different attitudes that

are not in use at the moment. If a child is asked what he thinks of arithmetic, he can probably give a statement of his opinion. In the arithmetic class, he may reveal his attitude in other ways. A set, however, is a preparatory attitude or state of readiness, induced by a rather specific stimulus, for making a certain type of response to a situation expected to occur. Let us take an example.

A half dozen sprinters are lined up on the track. The starter yells: "On your mark! Get set!" The pistol cracks, and they are off. They responded to the pistol shot by running down the track. But they responded to the command, "Get set!" by assuming a state of readiness to run, a postural set, poised and expectant, waiting to do just one thing. If one of the timers had coughed, some of the runners would probably have started off. Their readiness to respond was such that almost any stimulus would have had the same result. Similarly, in close-order military drill, there is the preparatory command, such as, "About face," or "To the rear," which produces no visible postural change. But when it is followed by the command of execution, the appropriate response is made. What happens following the first command but before the second? What is the state of readiness, the attitude of expectancy, the set, that is so produced? And how may it be employed effectively in other situations?

In a reaction-time experiment, the subject may be asked to press a telegraph key when a light is flashed. *What* he does is determined by the directions, the task or problem that is presented to him. *When* he does it, is determined largely by the final signal. Between the two stimuli he has time to concentrate on what he is going to do, to get organized, as it were; like the runner, he is motivated to do just one thing. In a similar way the *directions* of a standardized test and the *assignment* of a lesson should produce the expectancy or readiness response and so create a set. In the latter case, however, the second command is not necessarily given externally by the teacher, but may be given internally by the person himself.

Goal-Seeking and Set. Sometimes the first command producing the set is also given internally, as in the *delayed response* experiments. For example, an animal is trained to find food in whichever one of three entrances is lighted. After this habit is acquired, he is shown the lighted entrance, the light is then extinguished, and he is restrained for two, five, ten, or more seconds. When he is released, if the time has not been too long, he goes to the entrance which had been illuminated.

A similar situation is found in the *uncompleted task*. When one has

mislaid a book or other object, he continues to search for it even though other activities intervene. It has even been found experimentally that the details of an arithmetic or other problem, work on which has been interrupted, are apt to be more clearly recalled later than are those of one which has been solved. Apparently, something other than mere sensory pleasantness or unpleasantness is operating in these cases. The activity once started produces a kind of tension which continues over long periods of time. This tension may have been aroused by stimuli recently present, or it may be centrally aroused, or its intensity increased by the conscious recall or the imagining of states of affairs which are not at the moment present in the environment. Thus an individual might say, "I can't seem to keep my mind on my school work because of the game tomorrow," or "Oh, I almost forgot; I was going to the Lost and Found Bureau to ask if my book had been turned in there."

It appears that a large amount of the activity of man is of this delayed kind instead of being a series of responses to specific stimuli in the immediate environment alone. True, he responds appropriately to stimuli that *are* present. While looking for a lost article or following any plan, he usually avoids bumping into furniture, walks on the side walk, or stops for the red light at street intersections, as the case may be. But the direction he takes, and his selection of stimuli to respond to, as well as the response he makes to them are largely determined by his goal. Thus, if he meets a friend on the way, he will probably greet him and go on, instead of stopping to talk, or visiting a soda fountain with him.

Determining Tendency. One of the characteristics of maturity in the higher organisms is this capacity to continue along a line of activity in the direction of a goal. Immature organisms do not do this. Puppies have been observed to start out bravely in one direction and then suddenly veer off in another upon catching sight of a butterfly, or discovering an alluring scent. Similarly, children may undertake some task such as mowing the lawn or doing their "home work," and in a few minutes will be playing with the neighbors' children or listening to the radio. This is not so likely to happen when they are "highly motivated." For example, in a race, they are not apt to be so distracted by spectators or passing events as to wander off the track and up into the stands, though with younger children long-continued application even in games is not expected.

If a subject is asked to respond to each of a list of words with the opposite of each word, the directions determine the response he makes. Thus, for example, when the word "night" appears he responds "day," though

"club" would be quite as appropriate to the stimulus word by itself. Similarly, when the visual stimulus

$$\frac{\begin{array}{r}4\\3\end{array}}{}$$

is presented as a part of a series of test items, any one of a number of "correct" responses is possible. If the word "add" is given first, though without the figures, no intelligent response can be made. But if the directions at the top of the page read, "Add the following:" these directions control the ensuing activity so that 7 is the outcome and not 1 or 12.

If a subject tries to report his own experience introspectively when the problem or first command is given, he can find little conscious content. In the case of a muscular response, after the directions are given and the stimulus is expected, there is a condition describable in terms of muscular strain and attention. But if the experimenter says, "On the sheet of paper which I shall present to you are a number of pairs of digits which you are to add," the subject, if under no stress of speed, can probably not discover any change in himself, though his every act, when the paper of digits is presented, is controlled by the preceding direction to add; and during the time he may even be only barely conscious that he is adding. The activity goes on almost automatically.

Now this process, which is so difficult to describe, but so common in everyone's experience, is tremendously important in its implications, especially for education. For, clearly, the set created by the problem or task, with the consequent determining tendency, is the basic means of control of human behavior. It is the important factor in lesson planning and in assignments, in motivation, and in the development of attitudes.

Readiness. Set has been described as a relatively restricted attitude of readiness to make a particular response, followed by a tendency to continue along a line of activity in the direction of a goal. Furthermore, it has been pointed out that a state of readiness, whether of short or long duration, may be produced by external stimuli, such as instructions, commands, suggestions, and social pressures. It may also be produced by internal stimuli, dependent on personality and temperament and on instinctive drives and growth processes.

In educational practice, the term readiness is most frequently applied to the stage of physiological or psychological growth at which children are capable of undertaking some educational task. If a child is too young,

the desired set cannot be produced. He cannot give himself the commands internally; and, if they are given by someone else, he is incapable of following them because of his immaturity. His readiness, or lack of it, is a function of his stage of growth. Reading readiness, for example, refers to the question of the time pupils should first be taught to read. If they begin too soon, they cannot do what is expected of them, and trying to force them results chiefly in unpleasant emotional situations, negativistic responses, and perhaps rebellious behavior. If they begin too late, they are not interested in the simple stories provided and sometimes wish to cover their inability by various schemes of evasion. Many studies have sought to discover ways of finding out what is the best time to begin. An arbitrary decision that all children should start at age five or six is unsatisfactory, because children grow at different rates; some are ready earlier and others are not ready until some time later.

The best method seems to be to let the children themselves decide. If appropriate books are around, and the letters are made more or less familiar through signs and other devices, the situation produces its own set; children will begin to spell out what is written under pictures, ask about certain words, and so on. This is the time that reading instruction can go full speed ahead. For some the process will be a rapid one, while for others long hours of practice will be necessary.

Self-Selection. The fact that children themselves reveal to the alert teacher by their seeking behavior that they are ready to learn to read, and also what kind of reading they are ready for, suggests that they should perhaps be the ones to select other activities in which they should engage.[11] Some progressive schools have declined to provide courses of study beforehand, preferring rather to follow the developing interests and abilities of the child on the theory that by nature children seek out what they need if it is available. This is but the new form of the old doctrine of the *infallibility of nature*, implying that instinctive drives are universally good and beneficial to man, that "nature is always right." "God makes all things good; man meddles with them, and they become evil," says Rousseau in the opening sentence of his *Émile*, and he goes on to describe the development of an imaginary child who is not forced into the mold of the artificial culture of his time. To put children into a schoolroom when they would rather play outside is to "cut off the tadpole's tail," which, if left alone, will slough off at the proper time. Wait for the natural interest to appear.

[11] W. C. Olson, "Self-Selection as a Principle of Curriculum and Method," *University of Michigan School of Education Bulletin,* vol. 16 (January, 1945), 52–55.

Of course, this doctrine is followed today to a considerable degree anyway, much more so than it was in Rousseau's day. Toys and play apparatus are provided which children themselves choose to play with. The school curriculum is adapted largely to their interests, abilities, and needs. Clubs, sports, and leisure-time activities are set up for different age groups, and books, magazines and special newspapers, movies and radio programs cater to the child audience.

The contrary view is that man is by nature evil, "conceived in sin and born in iniquity," and plagued by original sin besides. Grown-ups know better than children what is good for them, and should punish them when they do not conform to the adult standards set up for them to follow.

Obviously, a middle ground is indicated, namely, that man by original nature is neither good nor bad, but has the capacity for almost any kind of development, depending on his neuro-muscular structure, on the nature of his environment, and on what is considered good or bad in the culture in which he lives. The original nature of a child cannot be trusted to develop into the kind of an individual desired by a culture if his environment is the sort that produces quite a different individual. It is natural for an oak tree to be tall and slender in a forest, and shorter with wide spreading branches in an open field. Families and schools throughout the ages have aimed to produce the kind of human nature they desire. Though they have been fairly successful, their errors have been due to their failure to employ proper techniques, that is, to provide the right kind of environment.

Of course, children cannot be given complete freedom of choice. They may be "ready" to manipulate gas stove burners, fire tongs, and knives, but there are consequences of such activity that they are not ready to understand and deal with. And certainly the surgeons who have administered poison antidotes and extracted coins and safety pins from children's lungs and stomachs would be the last to testify that children always know what is good for them.

The extent to which children of different ages can be trusted to select from their environment the things that they need has not yet been adequately determined. Supposedly a balanced diet is too much to leave to the decision of children from seven to thirty-five months of age. Yet when an adequate variety of simple, unmixed foods were placed before a group of children of this age range and they were allowed free choice, though they went on "food jags," over a two-week period most of them selected food which contained the right proportion of chemical

values.[12] Their total diet was well balanced, and they did not develop aggressions and become feeding problems, as so often happens when a regimen based on averages is forced on children. The self-selection principle has been found to work successfully for afternoon naps, for toilet habits, for the choice of primers and story books, and likewise in arithmetic, spelling, and art work. It operates most clearly at early ages, when children are developing rapidly but at different rates and before social experience has taught them what to expect. Conflict between individual desires and needs and the social demands must, of course, eventually be reconciled.

The initial aspect of motivation, the tendency to respond, has been shown to be the consequence of certain previously given stimuli which largely determine what response will be made. Whether as a result of some external or internal command, of some aspect of the situation, of the achievement of some level of growth, or a combination of these, the organism is given a set and is thus ready to make a certain kind of response.

5. The Beginnings of Action

Instinct as an Explanation. If we push our inquiry still further back, we shall ask what are the origins of the responses themselves, and in so doing throw some light on the causes of human behavior. For many years, easy explanations of why children and adults behave as they do were found in the concept of instinct, which was defined as a native or unlearned tendency of all human beings (and animals as well) to act in certain ways without foreknowledge of the consequences. Lists of instincts were drawn up, and behavior was "explained" by reference to them. There was something rather fatalistic about it all, and people even believed that war was inevitable because of the "instinct of pugnacity." This is the way it might work out in a school situation:

Thomas had recently come to the new junior high school. He was not a superior child by any means, but did not make trouble as some of the other boys did. He didn't get into fights on the playground; he didn't whisper or talk back to the teacher. Though he wasn't good-looking or well dressed, he was above the average in what might be

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[12] Clara M. Davis, "Can Babies Choose Their Food?" *Parents Magazine*, vol. 5 (January, 1930), 22–23. C. A. and M. M. Aldrich, "Habits Belong to Children," *Child Study*, vol. 16 (February, 1939), 111–113; and "Scientific Attitude toward Feeding," *Child Study*, vol. 19 (November, 1941), 9–10. Benjamin Spock, "Poor Appetite in Infancy," *Child Study*, vol. 18 (November, 1940).

called deportment or citizenship. After small sums of money had been missing from the school on several occasions, it was with considerable surprise that his teachers learned that Thomas had been caught red-handed taking money from the pocket of a coat belonging to one of his schoolmates.

Should Thomas' behavior be explained as caused by the "instinct of acquisitiveness"? If so, why didn't he take other things? Perhaps he should have been encouraged to collect postage stamps instead. When a psychological study was made of the case, if was found that Thomas felt excluded from the crowd because he could not treat his friends to soft drinks at the drug store across from the school. He had no spending money, so he stole from his friends to treat them! A little job in the lunchroom was procured for him, which fortunately ended all difficulty. No general instinct of acquisitiveness was operating; instead, unsuccessful efforts were being made by the pupil to solve a particular problem.

Not only do the instincts fail to explain behavior adequately, but the term is often used indiscriminately to apply to at least three separate concepts: inherited reaction pattern, habit, and drive. Since each of these is an important aspect of behavior and its motivation, they will be discussed at some length.

Inherited Reaction Pattern. Relatively simple and relatively unmodifiable, unlearned responses have long been known as *reflexes*. Among these are the iris (or pupilary) reflex, the patellar reflex (knee jerk), grasping, winking, sneezing, coughing, salivating, swallowing, smiling, and the like. When the stimulus which by original nature calls these forth is present (or some substitute stimulus made effective by conditioning), the reflex occurs, the response is made. Similar reflexes are found in the higher animals, and in all species they appear very early, some of them being present at birth, in which case they are called *connate*. More complex reaction patterns may likewise be identified, though they are more modifiable, show more variation as the individual grows older, or vary more from person to person.

Chief among these are the responses of fear, rage, and love. Watson referred to these as the "unlearned beginning" of the "activity stream," and in his pioneer experiments on infants described the stimuli which originally called them forth: for fear, a loud noise or sudden loss of support; for rage, confining the limbs and restricting bodily movement; and for love, the gentle stimulation of the erogenous zones.[13] He also

[13] J. B. Watson, *Behaviorism*, New York: The People's Institute Publishing Co., 1925, pp. 98–99. Also *Psychology from the Standpoint of a Behaviorist*, Philadelphia: Lippincott, 1924.

described the responses made; for example, "the striking of a steel bar with a hammer would call out a jump, a start, a respiratory pause, followed by more rapid breathing with marked vaso-motor changes, sudden closure of the eyes, clutching of the hands, puckering of the lips."

The responses have since been more carefully studied, and the differences between the fear and rage behavior have turned out to be less easily distinguished than originally supposed. The fact that the instinctive love responses are in part *delayed*, instead of being connate, does not keep them from being included in this category. But Watson's failure to find the fear responses occurring when infants were presented with furry animals, and his success in "conditioning" his subjects so that they became afraid of them, did much to vanquish the bogey of inborn fears. The fear response is innate, but the child learns to fear different things.

Some believe that the unlearned pattern reaction is the proper definition of instinct. Such a one is Bernard, who has written: "An instinct is not only an inherited action-pattern, but, in so far as it is a completely organized instinct it is also definite. It is a specific response to a specific stimulus or set of stimuli. One cannot inherit an abstraction. . . . These patterns of action thus determined by the inherited organization of structures we call instincts. Strictly speaking, one cannot inherit activities, but one may inherit the structure, the functioning of which determines the action patterns."[14]

The genetic development of these structures has been the object of a great deal of careful investigation. The fact that a number of reflexes are already present at birth presents a most interesting question: when do these movements first appear? The question opens up an area of detailed embryological investigation of the prenatal young of both human and subhuman species. In the human, with its relatively long period of gestation, the first one or two weeks after germination is referred to as the germinal period, the next three to six weeks the embryonic period, and from six weeks to birth the fetal period. Amphibians and birds are studied most easily, though careful researches have been made on fetal guinea pigs, rats, cats, sheep, and other animals.

Probably the best known investigations of *fetal behavior* are those which were conducted by G. E. Coghill on the six-inch salamander, Amblystoma. From these investigations the concept of *individuation* was developed. His observations were supplemented by motion pictures and by a detailed microscopic study of the growing nervous system.

[14] L. L. Bernard, *Instinct*, New York: Holt, 1924, p. 509.

The first spontaneous movement observed was a bending of the head to one side, which was shortly followed by further bending that brought the tiny fetal salamander into the shape of a ring or coil. Similar bending to the other side produced the wave-like motion of swimming. At this stage the forelimbs are beginning to grow out from the region of the neck. To quote Coghill:

> The first limb movement is an integral part of the total reaction of the animal, and it is only later that the limb acquires an individuality of its own in behavior. . . . The first elbow flexion occurs with action of the arm as a whole, the forearm only later acquires the independence of a local reflex. . . . So also is it with the movement of the hand and the digits. . . .
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> The definitive local reflexes of the forelimb arise by a process of individuation out of the total behavior pattern. [At first] it can do nothing excepting as the trunk acts. . . . The freedom it ultimately attains . . . has the appearance of being practically absolute, and the experimental reflex of this nature has come to be accepted as the elementary unit of behavior. . . .
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> Conduction paths do not come into existence, then, as absolutely new and discrete entities. They arise from a general field of organic activity by a process of specialization, emergence, or individuation.[15]

It is clear that Coghill is not only reporting his findings but is also using them as a basis for an interpretation of the nature of development. It is generally agreed that the development of fetal movement is cephalocaudal, that is, it begins at the head end and proceeds downward, and that in general, larger muscles become active before the smaller ones. Further, the progress of development is dependent upon the growing neurons and is related in part to their myelinization, the growth of the myelin sheath or axone covering. The question on which there is not yet complete agreement relates to the seeming priority of so-called mass movement to more specific responses. Coghill's experiments have given an impetus to an *organismic* view of life which is tending to supplant the more atomistic view. The argument centers around the nature of the "atom," in this case the cell and the reflex arc.

Development is not primarily the establishment of an association of multiplying elementary units to form a new whole, but rather, the

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[15] G. E. Coghill, *Anatomy and the Problem of Behavior*, New York: Cambridge University Press, American Branch, 1929, pp. 19–20, 88.

resolution of one whole into newly formed parts: it should be thought of not as a multiplication and cooperation of cells, but rather as a differentiation of protoplasm.[16]

The organismic view was developed in biology during the latter part of the preceding century but received little attention from psychologists until its later formulation in Gestalt terms. Coghill brings the two together in his statement: "Local reflexes emerge as, in the language of Gestalt, a 'quality upon a ground'; that is to say, they emerge as a special feature within a more diffuse but dominant mechanism of integration of the whole organism."[17] It is quite probable that the organismic view supplies a necessary correction for a proper interpretation of the nature of growth and development, of the acquisition of motor skills, and more generally the process of learning and motivation. However, as Carmichael has so clearly pointed out:

Much of the "movement of the organism as a whole" may be the result of rather specific proprioceptive stimulation. Such stimulation often leads to the "spread" of what are really quite delicately timed responses which can be easily mistaken for "vague" or "diffuse" behavior. . . .

That the cells and tissues do not develop in isolation does not necessarily mean . . . that the "nervous system is a complex dynamic organization which operates as a whole." On the contrary . . . the story of the development of behavior must be written not in generalized formulas, but in terms of the accounts of the development of specific processes, no matter how diffuse, occurring in particular organisms under definitely described environmental conditions.

There are functions which can never be understood in isolation; but by looking at the *totality* alone . . . the specific responses of the fetus will never be scientifically explained. . . . Because an early concept of the reflex was inadequate seems to be no reason to assert that there is no truth in the general view that behavior involves relationships between stimulus and response, some of which are more variable and some more specific than others.

So far as the fetus is concerned . . . an adequate explanation of its behavior at every stage in its development must be given in terms of the dynamics of its total organization. Such dynamics, however, can

[16] L. W. Sharp, *Introduction to Cytology*, New York: McGraw-Hill, 1926, p. 73. Quoted by O. C. Irwin, "The Organismic Hypothesis and Differentiation of Behavior," *Psychological Review*, vol. 39 (March, 1932), 128–146, "I. The Cell Theory and the Neuron Doctrine," p. 129.

[17] Coghill, *op. cit.*, p. 89.

be expressed only in terms of as adequate a knowledge of the relevance and particular structures and functions of the organism as possible.[18]

Some of the conditions upon which the complicated observed movements depend have been enumerated as follows: developmental stage, health condition, intensity of stimuli, number of repetitions of stimuli, strength and magnitude of initial movements, and the nature of the movements previous to stimulation.[19] At the present time, however, experiments on subhuman fetuses have supplied partial answers to the question of the beginnings of behavior. Following the organic movement of the heart and other organs, and the spontaneous non-neural or so-called myogenic movement, comes the first spontaneous neurogenic behavior, beginning at the head and progressing caudad through the trunk and finally to the limbs and tail. This is followed by responses to tactile and later other external stimuli, and by local reflexes usually appearing at first as parts individuated out of a larger pattern of response and acquiring various degrees of discreteness.

It is, of course, not possible to infer from subhuman *fetal* experimentation what *human development* is in spite of many similarities. The trunk bending, swimming, walking sequence of Amblystoma, for example, probably cannot be found in the ontogenous development of the human fetus. The generalized statement to the effect that ontogeny recapitulates phylogeny is only roughly descriptive and can hardly be said to be explanatory. Much, however, has been learned of human prenatal development, partly from stethoscopic and X-ray studies made of hospitalized mothers, and partly from the observations of fetuses removed operatively because of tumorous or other diseased conditions.[20] Some detailed observations have been made and reported.[21]

1. Constancy of response to a stimulus is absent. Each skin area may serve as a reflexogenic zone for various reactions which have a tendency to irradiate more or less over the whole fetal organism.
2. Movements are slow, asymmetrical, arhythmical, and uncoordinated.
3. The diffuse, massive type of response in younger fetuses becomes

[18] Quoted from Leonard Carmichael, "Origin and Prenatal Growth of Behavior," in *A Handbook of Child Psychology*, Worcester: Clark University Press, 1933, pp. 119, 135, 141, 142.

[19] Z. Y. Kuo, "Studies in the Physiology of the Embryonic Nervous System," *Journal Comparative Neurology*, vol. 70 (1939), 437–459.

[20] Arnold Gesell, *The Embryology of Behavior*, New York: Harper, 1945.

[21] M. Minkowski (1922), quoted by O. C. Irwin in "The Organismic Hypothesis and Differentiation of Behavior," *Psychological Review*, vol. 39 (May, 1932), 189–202. "II. The Reflex Arc Concept," p. 196.

replaced in older fetuses only in part by specific reactions to stimuli. Mass activity, irradiation, and diffusion come first, specificity later.

Thus it seems that the movements of the human fetus after the sixth to eighth week, when observable overt behavior appears, follow the pattern of individuation as set forth by Coghill. Before the fourth week the heartbeat, an independent, non-neural activity, has started, though it cannot be detected with the stethoscope until the fourth month. During this month the so-called "quickening" of the fetus occurs; this is a movement of arms and legs which, as certain of the reflexes appear at this time, involves neural activity and hence can be called true behavior. By the sixth and seventh months, the receptor-neuromuscular mechanisms act more independently; sucking, crying, knee jerk, and corneal reflexes have appeared, and in the eighth and ninth months, the tendon, iris, and grasping reflexes. Thus a number of responses have become individuated out of the larger total patterns, while others become specific only after birth.

Habit—the Development of Coordinated Movement. The development of motor coordination proceeds at a rapid rate. The manipulatory skills cannot be expected to appear until after the neural connections between sense organ, cortex, and muscles have been made; and, conversely, when these have been completed, they naturally must operate, provided adequate sensory stimuli are presented. Movements will seem awkward and fumbling at first, but will gradually become "individuated" and automatized after the manner of all motor skills. Experiments on children of preschool age have followed the development of some of these skills genetically. On the basis of their observations, Gesell and others (1938, 1940) have traced the evolving patterns of motor development, adaptive behavior, language development, and personal-social behavior (Table 3, p. 253). The patterns have been observed and recorded verbally and by means of motion picture film. The achievement of the upright position shows a succession of progressive modifications in head control, sitting, standing, and walking.[22]

Within the first six months, the infant progresses from a condition of utter helplessness, lacking practically all control of coordinated movement, to one of considerable effectiveness. He can manage the movements of his head, arms, and legs fairly well, and can even roll over. By the end of the first year he can creep, pull himself to a standing position, and perhaps even walk, though somewhat unsteadily. By the end of the

[22] See A. Gesell and others, *The First Years of Life,* New York: Harper, 1940. Chapter VI, pp. 67–74, "Motor Development," by H. M. Haverson.

second year, he can walk quite steadily and even go sideways and backwards, can push things around quite a bit, run some, climb on furniture, and operate fairly effectively on a staircase. He becomes increasingly agile, so that when he is four, he can hop and jump, and can catch, throw, and kick a large ball. At five he has improved his balance and general coordination in all respects including hopping on one foot, walking on tiptoe, and going up and down stairs alternating his feet.

As one reads this rapid summary of progress during the period of early childhood, he realizes that, while the picture is accurate, it is still only a partial one. For one thing, the adaptive behavior that evidences the beginning of intelligence is not included, the manipulation of objects, piling up blocks, drawing, counting, apprehending of form and number, and remembering. Nor does what Gesell calls the personal-social behavior appear here—the developing coordination and control in matters of eating, elimination, dressing, communication, and play—the responses of pleasure and displeasure and the approach toward and avoidance of people and situations. Most of this development of bodily and manual skills is under the control of the visual and kinesthetic senses. If these were all included, it would still be a silent picture, for the child also gains facility in the use of the vocal muscles through the auditory sense. A sound track would bring to life the maturing vocalizations from the birth cry through the various kinds of cries, gurglings, and verbal jargon to the fairly adequate language patterns of maturity.

Caution should be observed, however, in interpreting such data as these studies present since they are made on a relatively small number of children and do not emphasize the wide range of differences between those whose growth is normally slow and those whose growth is normally rapid. For example, if parents read that at 36 weeks a child "holds its trunk erect when sitting for an indefinite period," or at four years "can balance on one foot from four to eight seconds," and "carry a cup of water without spilling it," and their child at these ages cannot do these things, they are apt to become worried unnecessarily, unless they realize that some normal children do not do them until they are older. Conversely, they may take justifiable pride in the performance of their young prodigy because he performs such acts earlier than it says in the book. If the wide range of individual differences is appreciated, the motion picture of development as it unrolls becomes both enlightening and fascinating.

The process of development of these increasingly complex coordinations is interesting to analyze more closely. In the first place they indi-

cate what might be referred to as biological permission. A child is not allowed to make certain movements until the physiological structure is ready; and when it is ready, he makes them. Efforts to train children in these simple skills before they have matured sufficiently are generally unavailing; and although a precocious performance may in some instances be brought about, it is as a rule little more than will be attained without training a few weeks or months later. Adults do not usually try to speed the natural maturation process of children during the first five years of life, with the possible exception of toilet habits among middle- and upper-class families. Babies are taken care of physically and generally just allowed to develop. But when children are of school age, undue pressures are more likely to be exerted.

In the second place, the growth in bodily coordinations is sequential. One child may be able to perform act *a* before another child can; but both of them will perform act *a* before they can do *b*. This fact is further evidence of the physiological basis of developing behavior.

In the third place, the performances are not such separate acts as they may seem, but instead are aspects of total bodily movement. They are described most satisfactorily, as Coghill showed with the fetal salamander, as emerging from the mass activity of the organism. They are figures against a background of total activity which become differentiated, individualized, or individuated from the rest of the movements that are being made, sometimes because they are of practical significance, like creeping or walking, and sometimes merely because they are easily distinguishable from the rest, like hopping on one foot.

The final implication from the studies of the development of coordinated movement relates to the part that learning and instruction have to play. If children will develop anyway, we may ask why we should take the trouble to teach them anything. The answer is to be found in the fact that environmental conditions determine to a very large degree the kind of development that takes place. Different cultural groups in different parts of the world "develop" different ways of talking and gesturing, of eating, carrying burdens, and playing, and different attitudes and interests. The developing process is seen to be largely environmentally determined, and instruction may occupy a more or less significant place in the environment. In some cases it is more necessary than in others, and even when it is not absolutely necessary it is quite likely to make a difference. While children will develop the capacity for walking and talking, many will have bad posture and speech defects. When variations make little difference, almost any kind of performance is satisfactory, as, for example, when an infant rolls over, or a child

rollerskates. When, however, standards of performance are demanded, just any way of performing will not do. Skills must be practiced and instruction is necessary.

Many of the forms of behavior which were formerly classified as instincts it is now recognized are in reality habits, that is, modes of behavior which are developed in the process of continued contact with the environment. Some are practiced in social situations. They are acquired ways of responding which are accepted and rewarded by the culture in which the child grows up. The behavior is modified by the satisfyingness or annoyingness of the situation. In human societies there is a certain uniformity in the surroundings of growing children which tends to produce a similarity in their responses. But in the accounts of feral children,[23] who have grown up with animals, quite different modes of behavior are found. Such children are reported to run on all fours, eat with mouths to the ground, bay the moon, and, in short, exhibit few of the normal characteristics generally ascribed to human nature.

The processes involved in acquiring social habits will become clearer following the discussion of the responses to frustration and of social learning. However, a number of such *social habit patterns*, which used to be termed instincts, will be noted briefly.

Pugnacity, self-assertion, or aggressive behavior is apt to appear as a consequence of frustration and, especially in boys, tends to be rewarded in a competitive society, while bashfulness, self-abasement, and flight indicates an inability to cope with the situation. Curiosity stands somewhere between, depending on previous rewards and punishments and lack of familiarity. Gregariousness depends on satisfactions offered by group contacts, including esthetic and financial rewards, though certain types of people prefer solitude to crowds.

Group integration, that is, accepted participation in the activities of a group, is a form of gregariousness that is considered educationally desirable. Constructiveness is rewarded from the building-block stage on, though, owing to the satisfaction of destructiveness, there is an uneven balance between the two. Acquisitiveness is highly rewarded in a culture in which economic values are cherished and prodigality frowned upon except as ostentation and display. Imitation and emulation show few if any distinctive forms of their own, but are rather ways of learning to act in a manner that is found to be desirable or effective. Play activities are definitely imitative, and in their simpler forms involve doing what one can or what one is allowed to do that is

[23] Arnold Gesell, *Wolf Child into Human Child*, New York: Harper, 1941.

satisfying, with what one has at hand, while conventionalized forms have their own sets of incentives and rewards. Even parental behavior is in large measure acquired and in most countries there are laws with severe penalties to enforce it.

It is probably recognized that the names of these social habits are really abstractions which often fail to indicate exactly what the acquired pattern of behavior is. Thus, constructiveness may apply to a child building blocks or to an architect planning a house; and acquisitiveness may apply to filching coins from a friend's overcoat pocket, or pasting stamps in an album, and so on. Actual behavior is made up of great numbers of different responses which may be classified in various ways. The actual neuromuscular responses classified under any one head may differ greatly, and can often be classed under other heads. For example, if the architect is working for a fee, his planning might be considered as a form of acquisitiveness; and the young philatelist's endeavors, as constructiveness in building up a good collection! However, the names are useful, and the more they apply to what the individual is actually doing, the more useful they are.

It has perhaps become clear that another element enters into the classification, namely, that of direction, what the individual is trying to do, that is, the nature of his purpose, urge, or drive.

Drive. Human nature is dynamic, but this does not mean that there is something like instincts that makes it go. Such a view is like the animistic thinking of primitive man with his belief in good and bad spirits that control his actions. The mental process is called the *reification of abstractions*, that is, making a separate thing or entity out of observed phenomena and giving it independent existence and power. For example, it is observed that people sometimes act acquisitively, therefore it is their acquisitiveness that makes them act that way. Or they behave in a pugnacious manner, which is due to their instinct of pugnacity. It is possible, as we have seen, to describe the kind of situations which normally have positive or negative valence or "demand value," or in which "tensions" are aroused. It should be clear that reference is made, not to any part of the organism that makes the rest of it go, but instead, to characteristics of the whole living dynamic organism.

When the organism, for one reason or another, is deprived of certain basic substances which are needed for its continued existence, what is called an *internal deficit drive* appears. That is, overt, seeking behavior continues usually until satisfaction is obtained. In human beings there is also apt to be an awareness of the deficiency. Perhaps the most familiar

are the alimentary or food-seeking drives. Hunger and thirst are fairly common experiences in lesser or greater intensity, and various forms of behavior have developed for their satisfaction, including hunting and fishing, tilling the soil, and learning a trade, while water carriers, aqueducts, and reservoirs are employed to provide water. It should perhaps be noted that the stimuli one is conscious of are not always to be trusted as indicators of human needs. An individual may have a craving for opium, which is harmful, or for salt, which the system may need. But he may feel no craving for food containing the vitamins that are necessary for his health.

Drives appear more noticeable when what is needed is not available in the environment. When this is the significant feature of the situation, they are called *environmental deficit drives*. If there is a deficiency of oxygen under certain conditions, as when a person is submerged, he makes vigorous efforts to "get his breath." For its continued existence, the living organism depends on a rather narrow range of light and darkness, heat and cold, wetness and dryness. And too much of one to the exclusion of proper amounts of the other produces goal-seeking behavior. But drives derived from primary needs of the organism, internal or environmental, are not particularly significant as bases for school motivation, important as they are in the adult world where the procuring of "food, clothing, and shelter" for oneself and family constitutes a prime incentive. Schools are not accustomed to employ the threat of food deprivation, for example, to stimulate academic enthusiasm since society recognizes it as its task to provide these satisfactions in proper amounts for its children.

The satisfaction of the sex drive is hedged about with a greater number of powerful *taboos* than is the case for those already discussed; hence, its strength and omnipresence have perhaps been overestimated. If similar deprivation were socially prescribed in respect to food or water, or warmth, for example, one would no doubt find further evidence of the strength of these drives in the efforts made to attain satisfaction and to evade restrictive rules and regulations.

Young people need to be helped to work out satisfactory relationships with each other. They are usually anxious to conduct themselves properly and not make social blunders. They want to know about their developing bodies, and they have a right to be freed from foolish fears about natural symptoms or minor ailments they may have. And, lastly, they can properly demand that adequate provision be made for their having a reasonable amount of fun in socially approved ways. In all these respects schools can do even more than they have done. Advice and desired knowledge should be readily available, but the counselor

should not at the same time be the disciplinary officer. A school physician may be asked questions, answers to which will not be sought from a parent or teacher. Courses in sex hygiene have been successful in some schools, but wise instructors and parent cooperation are needed, or the instruction will run afoul of the very taboos it is set up to deal with. And, lastly, provision for group activities that are fun is important to offset the attractiveness of less desirable amusements. This does not mean that a school has done its duty by organizing a dreary school party in the gymnasium. The whole school program and atmosphere must contribute, as well as the environment in which the school is located. Since the environment is a matter of wider community concern, it may be necessary to enlist the help of other interested persons and agencies influential in community affairs.

6. Need

The Quest for Values. The three words, desire, want, and need, are often used interchangeably but they may properly be distinguished in terms of the degree of awareness and of their advantage to the organism. *Desire* may be applied to a condition of deprivation of which the individual is aware and which he wishes to alter, but without assuming that realization would necessarily be of any real advantage. Thus, a person may desire food, which is necessary; candy, which may be harmless but unnecessary; or morphine, which is positively detrimental. Drive is similar, except that the person may not be completely aware of its operation, and positive approach behavior is involved. The term *want* is used loosely to mean desire, drive, or need.

A *need* is a condition of a deprivation of which the individual may or may not be aware, the satisfaction of which is beneficial and perhaps necessary for the organism. In addition, a need is usually accompanied by a certain amount of more or less adequate striving behavior in the nature of a drive. Thus a person might be aware of the need for food but his behavior might or might not result in his obtaining it, though he would be well aware of what he was doing, whether he was robbing the pantry or working for a living. He might need security but realize only that he was unhappy, and so make more or less futile and undirected attempts to satisfy the need.[24]

Qualities of things or experiences that are needed and desirable are

[24] See H. A. Murray, "Facts Which Support the Concept of Need or Drive," *Journal of Psychology*, vol. 3 (January, 1937), 115–143. While Murray does not distinguish the two terms, his discussion suggests the desirability of some such differentiation as is here made.

called *values*, particularly when they are shared by groups of people. The conditions which provide these values or satisfy the needs are varied, and individuals can suffer from overabundance as well as from deficiency. But the latter is more common, and if satisfactory adjustment—to say nothing of human happiness—is sought, individuals must somehow be able to obtain them. Much of our social organization is designed to provide them, and schools fail in their mission if they do not do so. Some of the more significant values growing out of human needs will be discussed, together with some of their satisfactions—conditions which individuals tend to seek in either primitive or conventionalized ways.

Activity. One of the most fundamental needs is for activity, for moving oneself and other physical objects of the environment about. The squirming of the newborn baby follows upon weeks of intro-uterine activities which are as natural as the heartbeat and which continue to gain in complexity and regularity as the child grows older. The movements made are responses to various elements and combinations of elements in his environment on the basis of the condition or development of his own bodily organs or musculature—all spontaneous, every movement its own excuse for being. No need to tell the small child that, if he doesn't move about, his limbs will atrophy; he himself is spontaneous activity incarnate.

The natural bodily activity of childhood is *play*. Many attempts have been made to establish theories of play to explain its nature and genesis. Perhaps children play because they need to let off steam, according to the Spencer-Schiller surplus-energy theory; perhaps because they must prepare themselves for their later life activities, according to Groos's theory; perhaps because their primitive ancestors hunted and were hunted and so developed "instincts," vestigial forms of which now appear as play, according to the recapitulation theory of G. Stanley Hall. Metabolism releases energy along the gradually developing neural tracts connecting with muscle groups, resulting in various activities. These activities, whether behavioral, emotional, vocal, or other, tend to be undifferentiated at first. But they progress rapidly from the largely uncoordinated activity of the fetal period, to the more specific responses to different situations. The form which these responses take depends upon the structure of the organism and upon the social environment. The one essential is that they are and must be indulged in for their own sake.

During the *stages of development* of play behavior, different materials and forms of control are needed. In the period of solitary play, imaginary companions are frequently envisioned, some of them seemingly more real than actual people. Various simple objects and oft-repeated acts appar-

ently afford endless enjoyment. With the development of group participation in the nursery-school period, cooperative projects may be undertaken, and large construction blocks which provide exercise for the larger muscles are welcome. As children grow older, play becomes increasingly energetic and calls for positive direction that harm may not come to the participants. Gradually cooperative play in the form of games and team sports becomes more attractive with their accepted rules and their conventionalized forms which require skill and practice, and for which instruction and coaching are necessary.

Two educational aspects of play are of fundamental importance: one of these is its relation to physical education. Until quite recently, formal gymnastic exercises alone gave evidence of the school's awareness of the existence of the physical body. There are various reasons for this: formal gymnastics is economical of time and money; large numbers of pupils may be drilled at one time by one person with little or no need for apparatus or other facilities; it is in harmony with a former philosophy which prevailed in many schools to the effect that the unpleasant is beneficial; it is capable of formal systematic treatment, like grammar, and is thus appropriate as a conventional school subject. In spite of these reasons, the old gymnastic exercises have gradually been displaced by physical games and sports because they are almost if not quite as economical; they are enjoyable; they seem to furnish an opportunity for the development of desirable personal and social qualities; they give the body practice in coordinating its movements and acting rhythmically as a whole, which is more natural than moving jerkily, a segment at a time; and, lastly, they provide quite as much if not more beneficial physical exercise.

The second important educational aspect of play is its relation to the school subjects. Many of the efforts which have been made to get the play spirit into the classroom have merely been schemes to give the children a good time and make things as easy as possible without letting them realize that they are being educated. Obviously, the sugar-coating methods were doomed to failure, because baseball and arithmetic, let us say, are fundamentally different, the one being primarily for the sake of enjoyment, the other strictly utilitarian. Of course this does not mean that school work needs to be unenjoyable, but much of it must look elsewhere for its motivation.

A more intelligent approach, though frowned upon by many, is the provision for activity within the school program, either in the form of free activity periods in which the pupils may choose their own projects, or of group projects which involve planning, manipulation, construction, and cooperative endeavor. In any case, it is not expected that children

will "sit still and be quiet" for long periods of time. Schools recognize the pupil's need for activity.

Knowledge. The need for activity moves gradually over into a desire to explore, to seek out new experiences and to know about the nature of the world in which one lives. Some aspects of this knowledge are more definitely sought than others, and, as in the case of the other needs, some people are more easily satisfied than others. But, apart from the purely utilitarian value of knowing certain things, the quest for knowledge is to be observed in children, who ask "What?" and "Why?", and in scientists, who spend their lives finding out something that, so far as they know, has no practical significance. In fact, there is a certain enjoyment to be found by people of all intellectual levels in otherwise useless knowledge, such as batting averages, bird names, many etymologies, many historical facts, and the like. How much of the knowledge taught in school is useless without being interesting has long been a question.

The teacher who becomes discouraged sometimes (and what one of us does not?) at the lack of enthusiasm of school pupils—to say nothing of college students—may well question whether there is a felt need for knowledge, even though teachers and society may agree as to its value. And adults, too, are not always overanxious to add to their store of knowledge, if the lack of examinations in adult education programs is any indication. However, a balance of values must be maintained and satiety is an ever-present possibility. Educational programs must adapt to the needs of the pupils, and just any knowledge won't do, nor will just any method of providing it. And yet people of all ages want to know, and large sums of money (seldom too large) are spent by society on increasing the knowledge of its children and youth.

Sensory Enjoyment. The rather mild word, pleasantness, is used to refer to the positive affective quality of sensory experience, in contrast with the indifferent and unpleasant or painful. The recognition of a human need for such experience does not make one a hedonist, since there is no implication that it is the sole basis for choice, or that it is the proper basis for ethical evaluation. The fact is merely recognized that people prefer cushions to board seats, roses to rotten eggs, relaxation to continued strain, orchestras to sirens, and so on. Furthermore, if they are deprived of the opportunities for sensory enjoyment of one sort or another, they make rather strenuous efforts to obtain it.

To children, almost any nonpainful *sensory stimulation* is enjoyable. The kinesthetic sense gives satisfaction in swings and jungle gyms, in running, coasting, skating, and skiing. The tactual sense provides endless

enjoyments in manipulation, the gustatory sense is apparently pleased to sample many strange objects, while the joys of the eye and the ear are limitless. All unfamiliar objects are tried out on as many senses as will cooperate, and seemingly endless repetitions are equally delightful. It is perhaps in a way unfortunate that people as they grow older tend to lose the easy satisfaction earlier found in mere sensory stimulation. In fact, the adult who continues to enjoy youthful sports is even suspected of arrested development.

The plight of the adult in some cultures is made still worse by the fact that *sensuous satisfactions* are sometimes frowned upon as immoral or at least not to be compared with satisfactions to be derived from the quest of other values. In some groups, the poet or artist is only a little less dubious a character than the gourmet; and while a love of literature and art—sensuous enjoyment in its more conventionalized forms—may be respectable, there is sometimes a feeling that it should not be allowed to take the place of more serious matters. However, people continue to make themselves, their children, their homes, and their public buildings attractive and to seek enjoyment in the beauties of nature, to adorn useful implements, and to develop new rhythms and patterns in the arts.

Security. The internal and environmental deficit drives must eventuate in the satisfaction of basic physiological needs if the life of the organism is maintained. Economic security is the name given to their satisfaction, often referred to as "food, clothing, and shelter," for oneself and one's dependents. In the area of human values, security is the assurance that there will be a favorable balance between intake and output. If more is expended than is received, security vanishes, the organism starves, the firm goes into the red. In the economic sphere, there must be a profit, and the more the better. Psychologically, the child who does not have the physical or intellectual resources to meet his difficulties is helped by the parent without the necessity of putting forth the necessary effort he is incapable of. It is, as before stated, conquest without struggle, or in the proverbial phrase, tempering the wind to the shorn lamb. It necessarily includes *support* in the sense of provision for at least the bare essentials of food, clothing, and shelter. But it is something more than this.

In the second place, security includes *protection* from hostile individuals who are members of other groups. The school child seeks protection from the bigger boys among the pupils in his grade, and from the bully and the tease, among members of the adult group—the teacher or his parents. Sympathy, understanding, someone to take his part whether

he is right or wrong—these are needed by the child and usually found in the family circle. Instead of receiving such group acceptance, however, a child may be rejected, in which case he feels a dislike of himself, whether it is fancied or real, on the part of those from whom he has sought security.

A third characteristic of the need for security is *familiarity*. A familiarly structured environment contains objects and relationships to which the individual has learned how to respond. Thus a transfer to a strange environment—a foster home or a new school—takes away the feeling of security which a child craves. The conditions of deprivation include new teachers and schoolmates one doesn't know, and a feeling of strangeness and inadequacy, in which one has not learned what is expected and may not be able to do what is necessary. The appeal of one's home or room and the tendency of people to return to familiar surroundings give evidence of this need.

The fourth characteristic of the need for security is *direction*, or ordered regulation. Individuals, to be able to feel secure, must know what to do and what not to do. Certain things must be forbidden, others permitted, and still others required, for they know they will remain safe and unharmed if they are told what to do, and do what they are told. Insecurity comes when faith wavers and doubt arises. To feel secure at home, a child must trust his parents' judgment. When he no longer does so and instead relies on what he may think is his own, he has little further need for the psychological security the home affords. In reality, he has but shifted to some parent surrogate—the teacher or the leader of his age group. The demand for direction, however, is counterbalanced by that for mastery, in that he needs a certain amount of freedom to deviate within the framework of the ordered regulation and not be subject to a complete system of direction—one in which everything that is not forbidden is required.

Mastery. Psychologically, and educationally too, the importance of both play and work lies in the satisfaction which comes from mastery, that is, from control over a segment of the material or social environment. Such control implies effort of some kind, a setting-up of ends and the maintenance of those ends until they are attained. The most elementary form of the need for mastery, beyond mere negativism, is to be found in the desire for *reaction*. Children like to play with objects that respond to their manipulation in some way, whether it is knocking over a pile of blocks, bouncing or rolling of a ball, constructing a tower, or running an electric train. "What do you do with it?" or "How do you work it?" are natural questions about an unfamiliar toy, whether in the class of

playthings or sporting goods. Just any reaction, even if absolutely erratic or contrary, is better than none at all.

In a second form of mastery, a person usually desires to be responsible for creating some kind of order that did not exist before. He wants to "do something" more than just get a reaction with the means at his disposal, to shape materials effectively so that a goal is attained by the efforts he puts forth. Individuals seek out the opportunity for effective effort, for *accomplishment;* but effort with no goal or objective is avoided.

The applications of this principle are legion. The case has been cited of one gang of workmen who exclaimed, "Deeg here, deeg dere—all time for not'ing, like beeg fool! We quit!"[25] When the boss explained that they were hunting for a lost water-pipe, and that he felt as helpless as they, the attitude of the men changed at once to one of enthusiasm for the task. How often in school, children are told to study this and study that for no discoverable reason, and nothing to show for their labor if they obey! The ultimate reasons are not needed: the workmen did not care to know why they were searching for the water-pipe.

The school recognizes the importance of this principle. It comes out very clearly in the shop, where a boy may actually make a pair of skis or print an entertainment program. People usually find gratification in working toward some end which, though difficult, is yet attainable, and which, when they have reached it, gives them the satisfied feeling of having accomplished something.

Following the example of the shop, therefore, those concerned with the academic subjects evolved the "project method," in which the pupil activities are centered in some task, preferably one which the pupils think of and want to undertake and which has real educational value. Similarly, in the various forms of the activity program—unifying, as they do, manual and mental tasks in group undertakings—a well-defined and accepted goal is set up, the steps toward the attainment of which are planned and executed by the group. In some schools where a plan of individualized instruction is used the course is divided into work units, which, when they are done, are done, instead of into time units which seem to roll endlessly on. Exercise books in which the pupil can check his proficiency, and improvement curves by means of which he can chart his progress, are examples of devices being employed to this end. Then, too, the school, the clubs of various sorts—musical, literary, and journalistic; camera clubs, puzzle clubs, and the rest—as well as the athletic and

[25] See Whiting Williams, *What's on the Workers Mind*, 1920, and *Mainsprings of Men*, 1925. New York: Scribners.

political extra-curricular activities, furnish avocational opportunities for pupils to satisfy their need for mastery through accomplishment or effective effort.

It is real effort, too, that is expended. The child who is heard to exclaim, "Aw, that ain't nuthin'!" voices the well-nigh universal lack of interest in the too-easy task. The whole idea of the game, whether it be in the parlor or on the athletic field, is to find a task nicely balanced to the abilities of the player or players by a more or less complicated set of rules, so that there is something to be done, but to be done with difficulty. It is this principle of the game which schools need more than that of play; and, though many applications of this principle are now a part of the generally accepted classroom technique, many more are still to be worked out by the ingenious teacher.

A third aspect of the need for mastery is what may be called *deviation*, the freedom to choose within the social pattern or to select the pattern. Children like to arrange their toys the way they want them, to decide what to play or to work at without being "bossed around" all the time. Some people apparently just "like to be different," but all prefer to choose their own hats, their food, their jobs, and their marriage partners. They like to do as they please, at least so far as this does not interfere too much with the rights of others to do as they please. In early childhood, negativistic tendencies, stubbornness, and similar behavior which leads adults to say that the child "has a will of his own" are evidences of the incipient stages of self-assertion which later leads the young away from the protective security and once-needed direction of home to make his own way in the world. Choices may not be wisely made, of course. Pleasant new experiences off the beaten path may be more alluring than they are enjoyable or profitable. But they will be sought, if for no other reason than to escape from the treadmill of routine. The individual does have a right, within limits, to lead his own life, and schools can help him in many ways to make wise choices.

Fourthly, mastery includes the *recognition* which the individual is given in the group. A child—or an adult, for that matter—expects his presence and conduct to make a difference in the behavior of others, whether they smile, laugh at his jokes, pat him on the back, or even get angry at him. But in all such cases, at least a partial control of the situation is preferable, and practice or training is frequently undertaken to enlarge the scope of control. The need for recognition has been called the wish for worth, or the demand for *status*. It may depend on accidental characteristics of race, nationality, birth, or age, or on personal charm, whether the group is a family, a school grade, or an adult community.

"Now I have a sheep and a cow, and everybody bids me goodmorrow," said Poor Richard, voicing the importance of property as a factor. Status may likewise be a function of the *rôle* of the individual. Thus the child who assumes the rôle of breadwinner in the family or honor student in school may enjoy a higher status than the other children in the group. Or the recognition may be so favorable as to give *prestige*. These terms, already discussed in Chapter III, apply equally to other than school groups.

At the other extreme, the child who, because of poor clothes or physique, a foreign accent, lack of spending money, or peculiar habits or ideas, finds himself outside, disregarded, an isolate, calls for all a teacher's ingenuity in aiding him to correct the maladjustment. This condition, however, is not limited to such extreme cases. Every child, to be well adjusted, must be able to do something well. Hence it remains for the teacher to furnish opportunities for this excellence to express itself in some beneficial, or at least harmless, way. All cannot lead in school work, though many can in one phase or another. The same is true on the playground. Other opportunities are afforded by the extra-curricular activities and by the clubs, previously referred to. One child maintained a negative attitude toward all his school work until one day it was found that he could dance the clog, and this gave him the chance for recognition he so much craved and wrought in him the desired changes almost at once. However, the appreciation of just any one will not do. For children, as for adults, it is the approval or disapproval of those whom they most admire and in whose favor they most desire to bask that counts. Hence the question of prestige is a very real one; and it fares ill with a teacher or school when the leaders most universally admired are the ones whose influence is bad. Fortunate, indeed, is the teacher or parent whose praise is sought and whose disapproval is shunned.

The need for mastery in some situations, small or large, often outgrows the boundaries of accomplishment and recognition and becomes a craving for *power* and domination. In fact, there are those who say that the power goal animates and directs all human endeavor. The joy of beating an opponent, the satisfaction of getting one's way with others, of using people to further one's interests, of conquest of all sorts in the face of opposition—these things have a strong appeal, stronger to some than to others. Disinterested political leadership is perhaps less common than it should be, and self-aggrandizement—sometimes at the expense of one's supporters—is not uncommon. Those children and young people who are "natural born leaders" need all the guidance and help that can

be given them in order that, with their enjoyment of power, they may at the same time learn to act in the interests of those over whom it is wielded.

Service. Lastly, it should be possible to make a case for service to others as one of the great human needs. The term, service, is broadly used to include all *altruistic* activity such as the protection and care of those who are in need, or in any way being of assistance to others when there is no other important motive. Opinions clash sharply here. On the one side are the idealistically inclined who believe that this is one of the leading motives in the hearts of men; and on the other are the cynics, laughing at all such vapid illusions, and seeing only ulterior motives such as self-gratification (and perhaps a desire for publicity, and more business) that charity may furnish. Although people differ widely, there yet seems to be a well-defined need on the part of most children, as well as of grown people, for an opportunity to take care of something or somebody. The child will show extreme solicitude for dolls or pets as well as for a younger child, and, moreover, will be unhappy when the opportunity for such care is removed. True, the child's care is often misdirected and intermittent; but this is also sometimes true of adult helpfulness.

Perhaps the one thing that differentiates the present Western culture from some of its antecedents is the *humanitarian attitude* very generally extended to the unfortunate. The sick are not often neglected, nor are the aged and infirm taken out into the forest to die; cripples are no longer ridiculed, nor are the feebleminded and the insane whipped and chained. Newborn infants are not exposed, nor are they considered as children of iniquity to be tyrannously repressed. The humanitarian attitude may be the result of the interest of science in all things, recognizing no higher or lower, of the evolution of the democratic ideal, of religious teachings, or of the conscientious study of social phenomena with an intelligent realization of the consequences of humane and of barbarous acts. All these undoubtedly have their influence. That children be given opportunities to work unselfishly would seem to be imperative if any of them are to develop into men and women who will forego wealth and fame for the cause of science or for social and civic betterment.

In Summary

The psychological and physiological bases of action suggest techniques that can be used to motivate children in the direction of educational and

life values. Behavior is fundamentally positive—approach toward satis-fiers, or negative—avoidance of annoyers. If satisfying conditions are provided in the environment, they stimulate interests, which provide opportunities for varied learning experiences.

Attitudes, which are acquired states of readiness for positive or nega-tive behavior, are maintained if they themselves, as well as the ensuing responses, are satisfying. Undesirable attitudes, including stereotypes and prejudices, are subject to modification. Unfavorable attitudes toward educational tasks can be replaced by favorable attitudes if the tasks and the situations of which they are a part are themselves made satisfying.

Motivation for what is immediately at hand is dependent on the set of the individual to respond in certain ways. The set may be produced by external command in the form of orders or directions, by internal com-mand which the individual gives himself, or by the nature of the situation which stimulates him. The effectiveness of the response depends on the stage of maturity of the individual.

An analysis of how behavior begins and develops reveals that there are inborn action patterns, most of which are modified into various forms of habitual, coordinated movement as a consequence of their interplay with the environment. The drives and goal-seeking activities of the organism provide for the satisfaction of its basic needs. The schools that provide opportunities for the satisfaction of these needs—activity, knowledge, sensory enjoyment, security, mastery, and service—are the schools that are the most successful in pupil motivation.

Questions

1. What were your most pleasant high-school experiences? Your most unpleasant? Your most difficult problems? Were you able to cope with them adequately? What help did you receive? What help might you have received?
2. List some of your own personal satisfiers and annoyers. How do you account for them? How could you decrease the number of annoyers? Increase the number of satisfiers?
3. Are you able to trace any continuity in your interests from early childhood to the present time?
4. If you have any pronounced attitudes or prejudices, can you account for them? Can you modify them if it would be an intelligent thing to do?
5. Describe your behavior and feelings when you are searching for a lost object, or for a place to eat in a strange city.
6. Discuss the value of self-selection as a basis for curriculum construc-tion; for occupational choice.

7. Just how valuable is the assistance which the instinct psychology furnishes in explaining and correcting the following cases? Where would you look for causes of the behavior described?

   a. Ten-year-old George Thompson was good looking, well dressed, and of average ability, but he seemed to take delight in making the lives of the smaller boys miserable by knocking them down, twisting their arms, and making himself generally hated and feared by them.

   b. Mary Jefferson, in the sixth grade, was apparently the recipient of amorous notes found on her desk, which she said were from her boy friends, but which, it was later discovered, she herself had written.

8. Is a child by nature bad? good? What are your criteria for judgment? What meaning of instinct are you employing? If nature isn't always right, how can you tell what is right?

9. Is "progressive education," as you know it, hedonistic? Discuss.

10. What are the advantages and disadvantages of an activity program?

11. Does the school with which you are most familiar do enough toward giving the children an appreciation of the beautiful?

12. How may the school help to satisfy the need for security?

13. What mistakes are sometimes made in providing too much direction and not allowing enough room for deviation? Illustrate.

14. Give illustrations of ways in which the need for mastery can be satisfied. How does a "project" satisfy the need for accomplishment? Cite some projects which you might use.

15. Suggest desirable and undesirable things that children can do to gain recognition. What can be done with the child who wants more than his share? How much is his share?

16. What is the meaning of negativism, satisfier, annoyer, set, reflex, fetal, individuation, rejection, status, rôle, prestige?

Readings

Cameron, E. H. *Viewpoints in Educational Psychology*. New York: Century, 1930. Chapters I and III.
In Chapter I are quotations from James, and in Chapter III, from Thorndike, Watson, and Dewey.

Cannon, W. B. *The Wisdom of the Body*. New York: Norton, 1939.
In this volume, the concept of homeostasis is developed, providing an organismic base for the concepts of seeking and self-selection.

Carmichael, Leonard. (Ed.) *Manual of Child Psychology*. New York: Wiley, 1946. Chapters 2, 4, 6, 7, 16.
"The Onset and Early Development of Behavior"; "The Neonate"; "The Ontogenesis of Infant Behavior"; "Maturation of Behavior"; "Behavior and Development as a Function of the Total Situation."

Gifford, W. J., and C. P. Shorts. *Problems in Educational Psychology.* Garden City: Doubleday, Doran, 1931. Chapters III and V.

A number of opposing views of instinct are given in Chapter V, especially readings 1 to 9; while in Chapter III numbers 13 and 14 are quotations from Woodworth elaborating the concept of preparatory reactions and the drive mechanism.

Hunt, J. McV. (Ed.) *Personality and the Behavior Disorders.* New York: Ronald Press, 1944. Vol. I, Chapters 3, 10, 11, and Vol. II, Chapter 32.

"Dynamic Theory of Personality"; Level of Aspiration"; "An Outline of Frustration Theory"; "Psychological Deficit."

James, William. *The Principles of Psychology.* New York: Holt, 1890. Vol. II, Chapter XXIV. Also, *Psychology, Briefer Course.* New York: Holt, 1892. Chapter XXV.

In these chapters James presents the earlier view of instincts.

Murphy, G. (Ed.) *Human Nature and Enduring Peace. (Third Yearbook of the Society for the Psychological Study of Social Issues.)* Boston: Houghton Mifflin, 1945.

An analysis of the all important problem of maintaining peace that is far removed from the simplicity of the instinct psychology.

Murphy, G., L. B. Murphy, and T. M. Newcomb. *Experimental Social Psychology.* New York: Harper, 1937.

Much of this 1121-page volume provides documentation for this chapter. Of particular relevance are Chapter III, "The Biology of Motives," and Chapter XIII, "Social Attitudes and Their Measurement."

Murray, H. A., and others. *Explorations in Personality.* London: Oxford University Press, 1938.

The "press-need" theory is here developed.

Prescott, D. A. *Emotion and the Educative Process.* Washington, D. C.: American Council on Education, 1938. Chapter V.

The concept of need is discussed, and a list of needs is presented differing somewhat from the one given in this book.

Skinner, C. E. (Ed.) *Readings in Educational Psychology.* New York: Farrar and Rinehart, 1937. Pp. 213–222.

Selections on attitudes and interests by Allport, Thurstone, Fryer, and Cox.

Skinner, C. E. (Ed.) *Readings in Psychology.* New York: Farrar and Rinehart, 1935. Pp. 220–226, 354–358, 458–461.

In the first reference are selections on instinct from the writings of Darwin and of Watson; in the second, from those of Bernard; and in the third is a discussion of theories of motivation by Thomson.

Thorndike, E. L. *Educational Psychology, Briefer Course.* New York: Teachers College, Columbia University, 1914, 1925. Chapters III, IV, V.

Various instinct-habit patterns are described.

Waller, W. W. *The Sociology of Teaching*. New York: Wiley.

Wheeler, R. H. *Readings in Psychology*. New York: Crowell, 1930.
Chapter XXVII is by G. E. Coghill and describes the early development of behavior in *Amblystoma* and in man.

Woodworth, R. S. *Psychology, a Study of Mental Life*. New York: Holt, 1929. Chapter VI.
In the chapter entitled "How Activity Is Aroused: The Stimulus and the Motive" is presented a simple and yet scholarly account of the foundations of motivation.

Emotional Response

Motivation and Emotion. Children in school are not passive creatures who sit placidly in their seats waiting for knowledge to be poured into their open minds. Instead, they are dynamic organisms, always active, even when apparently quiescent, continuously responding to external and internal stimuli. Sometimes they respond to other stimuli than the words of the teacher, and in ways quite different from those the teacher may wish. Their ways of responding grow out of their psychophysical structure and have been modified by their home and community environment. So the school children may at times seem perverse and foolish, but it will usually be discovered that they are seeking, however irrationally, for satisfactions of their needs. They are constantly trying to make up for some deprivation. They are striving for the attainment of some goal, though they may realize only vaguely what it is.

When the immediate objective is attained, they continue responding, continue seeking other objectives and goals, and succeed in maintaining a kind of unstable equilibrium, integration, complacency,[1] or homeostasis,[2] as it has been variously called. We have seen that the function of the school environment is to provide what the pupils need in a form in which it can be profitably used.

The process of responding to the various stimuli, however, is not a simple one. Only in some of the reflexes and habituated acts is the behavior seemingly localized and automatic. For the others there is a diffuseness, a spread of action, feeling, and emotion that apparently involves the whole body. The person says he is delighted, disgusted, disturbed, excited, angry, well pleased, and so on. These aspects of behavior are apt to be neglected in school, except when they interfere

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[1] R. B. Raup, *Complacency: The Foundation of Human Behavior,* New York: Macmillan, 1925.
[2] W. B. Cannon, *The Wisdom of the Body,* New York: Norton, 1939.

with the work in hand, whereas they are an important part of the learning process and of all life adjustment. To understand children, the teacher needs to understand their emotional life, and his own as well, and know how to deal with it and control it, and how to develop it and enjoy it.

1. CONSEQUENCES OF MOTIVATION

Satisfaction. The process of responding adequately to a situation is accompanied by pleasant affective experiences which may range all the way from mild pleasantness and satisfaction that things are getting along all right to intense emotional pleasure and joy. In general, it may be said that the normal activity of the body in the process of attaining objectives that lead to the satisfaction of needs is what contributes most effectively to the individual's feeling of well-being.[3] If enough good food, rest, sunshine, and exercise are obtainable, so that the physiological organism is strong and healthy, if there is sufficient opportunity for free activity, for striving for ends which he considers desirable, and for the appreciation of things which are to him beautiful; if in the eyes of his comrades there is something of respect for him; and if there are those in whom he can confide and those whom he can in some way serve, man may experience that feeling of happiness which has been the goal of life for untold generations.

Conflict. Such satisfaction is not always attained, however, if for no other reason than that some desires conflict with others. A man cannot attend a committee meeting and a ball game on the same afternoon; a child may have to choose between apple pie and caramel custard, between going to a party and staying at home to study, between a good time and scholarship, between basketball and piano practice, between getting a good mark and being intellectually honest. Everywhere one desire gets in the way of another; and the choice of one course of action does not always eliminate the desire for the other.

The most frequent conflicts perhaps arise from the desire to satisfy individual needs and at the same time maintain status in overlapping social groups. Thus, young people of any age, in order to satisfy the need for security, are torn between following the way prescribed by their parents or the adult group and that of their contemporaries, whether it be in halloween pranks, "telling the teacher on" a schoolmate, the time for coming home from parties, or any one of a hundred other situations

[3] C. J. Herrick, *An Introduction to Neurology*, Philadelphia: Saunders, 1915. (Rev. ed., 1931.) Also C. S. Sherrington, *The Integrative Action of the Nervous System*, New York: Scribners, 1906.

in which the conventional folkways and mores prescribe one kind of conduct, while youthful desires sanction another.

Thwarting. Satisfaction is likewise often unattainable because one is blocked by external circumstances over which he may have little or no control. Thwarting implies some force or circumstance that lies across one's path. It may be a high stone wall or a broad stream, or something less substantial but no less potent, such as an official order from the boss, or a friendly request. The parental "No, no," is followed by the pedagogical "You are not allowed," and later by the collegiate "No student shall."

The thwarting may be due not so much to external circumstances as to one's own weakness or insufficiency, for which, however, one may or may not be culpable. The child who fails on an examination, or who does not make the team, or who is not elected to the coveted office, may be lacking in sufficient intelligence or vitality or social ease. A workman may be unintelligent or untrained, or irregular or careless or impudent and a trouble-maker. Lack of education or technical training, physical handicaps, and emotional instability may make any person ineffective, whether as a laborer, salesman, lawyer, or teacher, and hence unable to find the employment which may be necessary if his needs are to be satisfied.

The whole school program is, of course, aimed at helping the individual adequately to meet the situations which confront him and those which will later confront him. And for those with special handicaps or disabilities special help is provided to correct physical abnormalities and sensory defects where possible and to provide special help to the backward, including remedial instruction, coaching, and tutoring. In order that as many as possible may be fitted to adjust to the socio-economic order in which they must compete, diversified curricula and vocational and prevocational training have been offered; and students have been helped to find themselves through intelligence and vocational tests and clinical techniques. These aids, supplemented by community surveys, have contributed to more effective educational and vocational guidance, while part-time schools, evening schools, and continuation schools have placed further education and training within the reach of those who have never had it before. The school is trying out many schemes, that the individual may not be thwarted by his own insufficiency in the satisfaction of his needs.

He may be unable, however, to satisfy certain of the needs because of the environmental structure in which he lives. This is, of course, only

the other side of the condition already discussed. A wall may be considered as stopping a person's progress, either because he is too small to climb it or because it is too high to be climbed. In the first case we consider helping the individual; in the second, lowering the wall. If the social structure is such as to deprive individuals of the necessities of life, no matter what they may do to help themselves, educators and other citizens become responsible for correcting such injustice.

The improvements which have been made in pupil classification through the use of standardized tests and other evaluation techniques show the interest of the school in this problem. Whether ability grouping or individualized instruction is the plan employed, more flexible promotions or more flexible curricula, the object is to make the school society more nicely adapted to the pupil abilities, a task in which parents, teachers, research bureaus, and curriculum-builders all cooperate for the creation of a school environment so structured that provision is made so far as is humanly possible for the satisfaction of the needs of all.

Emotion and Frustration. When people's desires conflict, or when their efforts are thwarted, they are said to be frustrated. Goal-seeking behavior is blocked. Efforts to get what one wants or to continue in a chosen line of activity are interrupted. The kinds of behavior which follow frustration, and the efforts to maintain adjustment and to re-establish some sort of equilibrium, are many and varied and will be examined in this and the following chapter.

The first responses which occur following frustration are usually those which would be classed as emotional. When a small child is deprived of a plaything, when the driver of an automobile is unexpectedly confronted by a detour sign, when a boy is debarred from athletics or a girl from graduation because of poor scholarship, an emotional outburst may be looked for. In its observable aspects, it will be like the responses of the infant whose arms are held down to his sides. Ranging between grief and anger, whether intense or not, it is the primitive, infantile, emotional response in which children indulge when thwarted, and which many never outgrow.

In a complex social order, emotional responses are nonadaptive in that they are uncoordinated, overflowing the channels of learned reaction which have been built up over a number of years. The person who lets himself give way to an emotion, though he may be expressing his personality with exactitude, is likely to say and do things which he will later regret, for the things he desired to bring about may then become impossible. An employee, if he wishes a raise in wages, would be unwise

to swear at the foreman who has rebuked him. True, it sometimes happens that a child will learn to cry and, if need be, to go into a tantrum to get what he wants; man's anger and woman's tears are reported to be similarly effective; but these become largely voluntary responses and are classifiable as gesture or language rather than as emotion.

Since school programs of necessity place obstacles—in the form of lessons, examinations, and getting along with others—in the way of pupils, and, since the problem of adequately dealing with the consequences of the frustrations is an ever present one, these matters will be dealt with in detail. First, then, what is the nature of emotion?

2. THE NATURE OF EMOTION

Emotion and Affectivity. It is first desirable to distinguish between emotion and affectivity—the feeling of pleasantness or unpleasantness. A colorful sunset, a Beethoven quartet, the fragrance of a rose, mild exercise, and reading a story, to many people are pleasant experiences, while a city dump, a fire siren, putrid meat, carrying a heavy suitcase, and trying to solve a problem that one cannot solve are unpleasant. It is fairly easy to make a judgment not only of whether or not an experience is pleasant or unpleasant (or indifferent), but also to distinguish between degrees of pleasantness. A pupil may say, "I like English more than I do arithmetic," or "Mr. X is all right, but I can't stand Miss Y." All kinds of situations may be experienced as pleasant or unpleasant, even emotions, such as joy and grief, but emotions have other characteristics, as we shall see.

Emotion as Conscious Experience. Joy and sorrow, fear and anger, love and hate—such experiences as these words symbolize are familiar ones, even though it would be impossible to define them in such a way that their meaning would be clear if one had not himself had any emotional experience. It is even difficult to study them introspectively, for when one, as it were, says to himself: "I am very angry; let me seek to discover what this thing called anger is like," his anger has been replaced by an attitude of observation and inquiry, and what he sought to examine has fled. However, sensations of the internal organs are frequently felt, as well as kinesthetic sensations, particularly of the muscles of the face. It can be said that emotion is a complex and diffuse mental experience involving organic and kinesthetic sensations of varying intensity, oriented toward some external person or object, and having a strong feeling tone of pleasantness or unpleasantness. Such a definition is, of course,

inadequate, but it will serve to delineate the conscious experience one has when he is in the throes of an emotion.

Emotion as Physiological Response. When some one else experiences the emotion, the situation is quite different. His face may be observed to go through a series of strange contortions, he emits peculiar sounds which are not words, he may jump about and shake his fists, or he may crouch and tremble. If the examination is carried further, it would be found that his heart and lungs and other organs are behaving in unusual ways. In short, there is a diffuse neural discharge over many pathways producing complex pattern reactions involving the visceral organs and glands as well as the skeletal muscles. This definition makes emotion an instinctive response pattern, which it is, though the overt behavior involved can be greatly modified by learning.

The James-Lange Theory. Many efforts have been made to discover exactly what the relationship is between the conscious experience and these bodily changes. The generally accepted belief used to be that the stimulus situation—the growling bear or the angry word—provoked the emotion of fear or anger which, in turn, produced the characteristic responses, in part observable by the bystanders, and in part revealed only to the person undergoing the emotional experience. Thus it was the emotion which *caused* the trembling, the tears, the dry mouth, and the palpitating heart.

The American psychologist William James[4] and the Danish physician Carl Lange,[5] who were working on the problem at the same time, though quite independently, were not satisfied with the mystic rôle thus assigned to emotion, interposed between the stimulus and the observable motor responses. Instead, they preferred the view that the bodily changes are direct responses, and the emotion is the way these make one feel. James's own statement of this theory is:

. . . That the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur *is* the emotion. . . . Objects *do* excite bodily changes by a preorganized mechanism . . . the changes are so indefinitely numerous and subtle that the entire organism may be called a sounding board, . . . and every one of the bodily changes, whatsoever it be, is *felt* acutely or obscurely, the moment it occurs.

[4] William James, *The Principles of Psychology*, New York: Holt, 1890, Vol. II, 449 ff.
[5] C. G. Lange, *The Emotions*, Baltimore: Williams and Wilkins, 1922.

It is unnecessary to go into the extensive controversy which the promulgation of this theory aroused, echoes of which have not yet died down. Objections, confirmations, and revisions have flooded the market. It has been pointed out that the motor responses themselves may act as further stimuli, as when one is perhaps more frightened still when he feels his knees knocking together. Some, not content with James's dependence upon sensation, added the conative, or will, aspects of consciousness to the emotion. The physiologists have traced the involvement of the nervous system, while the behaviorists rejected the theory for the reason that from their point of view the bodily changes themselves, rather than any introspectively reported feelings, *are* the emotion.

James pointed out that it is quite impossible to think of what a strong emotion would be like without the feelings of its bodily symptoms. All that would seem to be left would be a cold and neutral state of intellectual perception, which, however, when accompanied by the bodily changes, is very important in determining the quality of the emotion, perhaps more so than the more obvious motor accompaniments themselves. For example, cases have been cited of patients suffering from a lesion in the thalamus, who, though they may laugh for hours at a time, or burst into tears without provocation, experience only a feeling of surprise or shame for making such fools of themselves. They are really neither gay nor sad. James had written that some "do not discriminate between a feeling and its habitual motor accompaniments, and erroneously take the latter as proof that the former must be there." Since, however, the usual physical conditions which accompany emotional experiences are so important, so much a part of the emotion, we may do well to inquire a little further into their physiological mechanism.

3. Physiological Mechanisms of Emotion

The Autonomic Nervous System. Emotional responses are chiefly the involuntary action of the smooth muscles (sometimes called unstriated or visceral), the muscles largely controlling the activity of the viscera, the internal organs of the body including the glands. However, the emotion may also involve the striped muscles (sometimes called striated or skeletal), which move the skeleton around in ways that can be easily observed. In general, it may be said that the striped muscles receive their nervous stimulation, or are innervated, through the agency of the cerebro-spinal nervous system—the brain and spinal cord and the connecting nerve tracts that control overt bodily movement. Both striped and unstriped muscles are innervated by the autonomic nervous system,
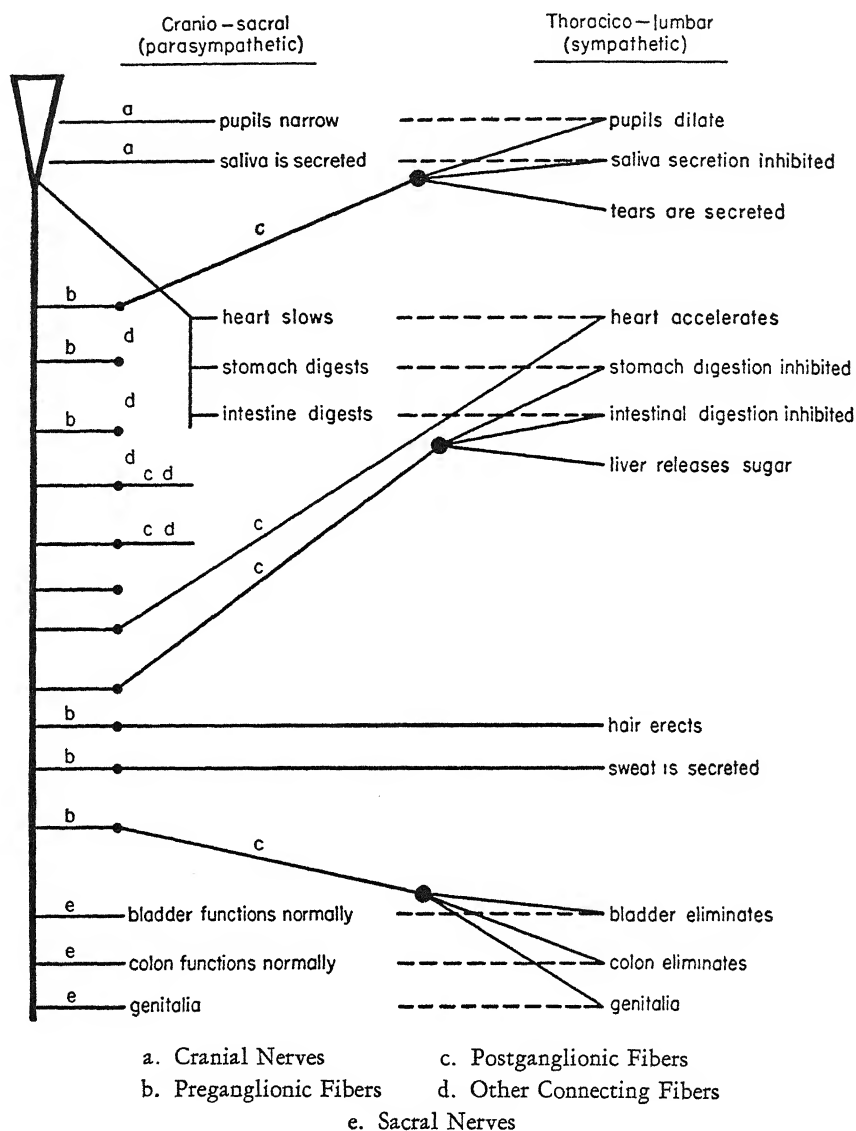
Figure 7.   Diagrammatic Representation of the Autonomic Nervous System

which, as its name implies, operates autonomously, little subject to voluntary control.

The autonomic nervous system is divided into two segments, the cranio-sacral (or parasympathetic) and the thoracico-lumbar (or sympathetic), which have contrasting and interacting functions. The fibers of the cranial, or upper, division of the cranio-sacral segment leave the spinal cord through certain of the cranial nerves, some of which connect with the head and face muscles and some with the viscera. When they are innervated, the resulting movements can be described as rather narrowly physiological. The iris muscle contracts, reducing the size of the pupil of the eye; saliva is secreted, as is also the digestive gastric juice in the stomach; peristalsis, or digestive movement, of the stomach and intestine occurs; and the heart rate is slowed down. The influence of its action, it may be seen, is conserving and upbuilding, and its proper functioning seems to bear a close relation to the feeling of well-being. In like manner, the sacral division (the lower division of the cranio-sacral segment) controls the mechanisms of normal elimination through colon and bladder contraction and discharge, as well as those of sex excitement.

The sympathetic segment of the autonomic nervous system is connected with the spinal cord by a series of preganglionic nerve fibers, so-called because the innervating nervous current passes from the cord first to two strings of ganglia, or clusters of cell bodies, one string on each side of the cord. Postganglionic fibers connect with the ganglia and innervate various organs, many of which are also connected with the parasympathetic segment.

The action of the sympathetic segment is in general opposite or antagonistic to that of the parasympathetic. Its innervation produces pupil dilation, inhibition of salivary and gastric secretion and of the peristaltic movements of the stomach and intestine, colon, bladder, and genital emission, acceleration of the heart action, erection of hair and outpouring of sweat, as well as stimulation of the liver, resulting in a more rapid discharge of sugar (or glycogen) into the blood stream. The influence of its action may be seen to be disruptive of the normal physiological processes. Moreover, because of the passage of the nervous current through the ganglia that are connected with still other ganglia, the resulting responses are diffuse, tending to take place together.

If one pauses for a moment to picture the individual with some of these symptoms, it would seem that he is laboring under rather severe emotion. The inhibition of the digestive processes, though not so important for the fiction writer or the scenario director as tears or rapid

breathing, has been demonstrated by the use of the X-ray as well as by chemical analysis of the stomachs of calm and of frightened animals. There is some evidence for the theory that relaxed and pleasant feeling tone accompanies increased action over the cranio-sacral or parasympathetic nerves, and strained and unpleasant feeling tone increased action over the sympathetic. However, even fairly intense sympathetic action as in anger and rage may occasionally be quite enjoyable. More intense or disruptive emotion may involve both segments.

The Emergency Theory. The response produced by the action of the sympathetic nervous system, and supplemented by the secretion of adrenin (see below), suggests a particular kind of emotion, namely, that aroused in anticipation of physical combat. On the basis of careful and extensive physiological investigation, Cannon propounded what is known as the emergency theory of the emotions.[6] According to this theory, the emotion of anger or rage is to be described physiologically in terms of the action of the sympathetic nervous system and the adrenal glands. Their function is to put the individual into a condition of readiness to meet some physical emergency. The chief bodily changes viewed from this angle are (1) the liberation of blood sugar, the source of energy; (2) the increased activity of the heart; (3) the direction of the blood stream away from the digestive organs and to the skeletal muscles, so that (4) fatigue products are carried away more rapidly, and (5), due to the presence of adrenin, the more rapid coagulation of the blood in case of a wound.

The Thalamic Theory. While these bodily changes are undoubtedly to be found in the more intense emotions such as fear and anger in the face of danger, and perhaps in less severe emotions as well, the injection of adrenalin into the blood stream, though it usually produces these same changes, does not as a rule result in a condition which the subjects call emotion. They feel "queer" or "as if" they were angry or frightened. Apparently there is a mental or cortical factor also operating if a genuine emotion is produced. Cannon and others have therefore supported a thalamic theory of the emotions.[7] According to this theory, the sensory nerve fibers from the receptors (eye, ear, etc.) pass through the thalamus, which acts as a coordinating center for all emotional reactions, relaying the nerve current to the viscera (through the sympathetic nerv-

[6] W. B. Cannon, *Bodily Changes in Pain, Hunger, Fear, and Rage,* New York: Appleton, 1929.

[7] W. B. Cannon, "Again the James-Lange and the Thalamic Theories of Emotion," *Psychological Review,* vol. 38 (July, 1931), 281–295; also C. W. Darrow, "Emotion as Relative Functional Decortication: the Role of Conflict," *Psychological Review,* vol. 42 (November, 1935), 566–578.

ous system) and also to the skeletal muscles, thus producing the overt emotional responses. The nerve current may also be relayed to the cerebral cortex, producing differentiated conscious emotional experiences. In addition, the cortex may act upon the thalamus as an inhibiting agent to reduce the intensity of the emotional responses.

The Endocrine Glands. It has been pointed out that the autonomic nervous system is the neural mechanism by which the fundamental organic processes are carried on, the action of which is at least in part responsible for emotional responses. However, the emotional processes are far more complicated than this and lead to a study of the ductless glands. The existence of some of these peculiar little sacs in different parts of the body, secreting small quantities of chemical substance of one sort or another, has long been known. It is interesting to note in passing that Hippocrates (460–357 B.C.), called the "father of medicine," advanced the doctrine of the humors or bodily fluids, which long formed the basis for the classification of the temperaments.[8] Some of these humors were secretions of the ductless glands.

In recent times, however, with the employment of careful techniques of observation and experiment, great progress has been made toward a comprehension of the function of the glands, though of course it has been quite outstripped by the widely trumpeted claims of quacks and charlatans. A number of the glands—the tear, sweat, and salivary, for example—are like tiny clusters of grapes; they gather from the fine blood vessels in their walls the chemicals required and secrete their juices through little tubes or ducts which join larger ones that discharge into the body or upon its surface. Others, called ductless glands, or endocrines, discharge their tiny secretion of *hormones* directly into the blood stream by the process of osmosis through the delicate veins that interpenetrate their walls. Some, like the sex and intestinal, are glands of both external and internal secretion.

The glands which have the most influence on behavior, so far as that can be distinguished from such purely physiological functions as digestion, are the pituitary, the adrenal, the thyroid, and the sex glands, or gonads. Other ductless glands are the pancreas with its "islands of Langerhans" and their insulin hormone, and the parathyroids, and others about which there is doubt that they have an endocrine function—the pineal and thymus and the stomach and intestinal glands.

The *pituitary* gland at the base of the brain, sometimes called the

[8] J. R. Irwin, "Galen on the Temperaments," *Journal of General Psychology,* vol. 36 (January, 1947), 45–64.

hypophysis, is made up of an anterior and a posterior lobe. The *anterior lobe* secretes a number of products which influence the activity of other glands and have a marked influence on sexual development. One product has been found to stimulate mothering and nest-building in the case of rats. A growth hormone in abnormal amounts produces giantism, and after puberty an enlargement of the bones of the extremities, accompanied by irritability, loss of memory, and general apathy, while a deficiency results in certain kinds of dwarfism. The hormone of the *posterior lobe* has a part in controlling the water balance of the body.

Each of the two *adrenal* or *suprarenal* glands, so named because they are near or just above the kidneys, is made up of two parts, a cortex or outer portion, and a medulla or inner portion, though one part is not set off sharply from the other. The hormone complex produced by the *cortex* is called cortin. The nature and effects of the various hormones making up this complex are not too well understood, but a deficiency produces fatigue, lethargy and low blood pressure, loss of appetite and insomnia, irritability, irrationality. Complete deficiency is fatal. There are relationships to oxygen consumption, the ability to resist heat and cold, disturbance of salt metabolism, and interference with the growth processes. Insufficient secretion sometimes results in a syndrome known as Addison's disease, in which the chief characteristics are a brown pigmentation of the skin, insomnia, and such psychological symptoms as lethargy and irritability. In excessive amounts it produces precocious sexual development, or an acceleration of the growth of masculine characteristics.

It is the *medulla* that secretes the hormone adrenin (also called adrenalin and epinephrine), which has been isolated and can be made synthetically. The effect of this hormone on the body is in part like that of the sympathetic nervous system, as has already been described. It is produced in greater quantities in times of strong emotion, and its effect is to contract the arteries, thus checking the flow of blood to the viscera, to accelerate the heart action, to liberate stored up energy in the form of sugar or glycogen from the liver, and to hasten the coagulation of the blood.

The *thyroid* gland consists of two lobes lying one on either side of the larynx and trachea just under the skin of the neck, and weighing from one to two ounces. The thyroid hormone, thyroxin, like adrenin, has been isolated and is made synthetically. Too little of this hormone in the blood stream brings about a sharp reduction in the basal metabolic rate and produces a condition which, in its extreme form, is known as cretinism. The body of the cretin is dwarfed and paunchy, infantile in

its proportions, with yellowish skin and little hair; the muscles are weak, the blood is poor, and the nerve cells are shrunken. Mentally, he is an idiot or an imbecile, expressing emotions and bodily needs by grunts and other inarticulate sounds. If thyroxin is administered soon enough, it will improve this condition, which will recur, however, as soon as the treatments are suspended.

Myxedema is a name given to hypothyroidism when it comes on after the child is born. In school children the affliction may not be recognized for what it is. Physical and intellectual regressions which resemble some of the characteristics of the cretin result, as well as mental retardation and physical underdevelopment. Adult myxedema is sometimes not recognized, but the patient may be depressed and unhappy and may be thought to be suffering from general poor health or chronic nervous exhaustion. The common endemic goiter, found around the Great Lakes and in other regions, is due to a deficiency of iodin, an important ingredient of thyroxin, the lack of which causes the gland to enlarge. This deficiency, it is pretty well agreed, can be made up by the use of such minute quantities of crystalline iodin as are obtained from the use of iodized table salt.

Excessive secretion of the gland, known as hyperthyroidism, results in exophthalmic goiter (Graves' disease), the psychological symptoms of which are in some ways opposite to those of cretinism. The patient exhibits no mental deterioration; and, instead of a picture of sluggish obesity, he is thin and restless; his pulse is rapid; the eyeballs sometimes protrude slightly; he is likely to be irritable, intractable, and inconsiderate. The number of women with this disease is about five times the number of men. It is probable that the sluggish and the excitable temperaments with which teachers have to deal are due, at least in some cases, to the inherited thyroxin supply, and failure to recognize this may result not only in unnecessary disciplinary situations, but also in unwise educational and vocational guidance. However, the hypothesis that slight hypo- and hyperthyroidism produce sluggish and volatile temperamental types respectively is unsubstantiated.

Attached to the thyroid are four small glands, smaller than French peas, the *parathyroids*. Their removal results in convulsions, tetany, and death. An insufficient amount of the parathyroid hormone reduces the calcium and increases the phosphorous content of the blood, resulting, some authorities believe, in a number of temperamental symptoms including irritability, aggressiveness, and lack of amenability to discipline.

Several different hormones from the *gonads*, or sex glands, have been isolated. Their effects are many, including the regulation of erotic desire,

physiological growth, and the development of the primary and secondary sex characteristics. The importance of the gonads upon behavior has long been known to animal breeders, who since ancient times have made the stallion and the bull into the tractable horse and ox by castration. The effect of the removal or the atrophy of the sex glands upon human males before puberty is to produce a somewhat infantile or feminine appearance; hair does not grow on the face, the voice remains high-pitched, and the muscles are weak. In the case of females, the characteristic skeletal changes are not found; hair is apt to grow on the face, the voice becomes coarse, and the bones increase in length. Both tend to approach a common neutral state characterized also by lack of sexual and mental development. Removal or atrophy after puberty, however, apparently produces few of these physical or psychological effects.

Treatment of eunuchoidism, or sexual infantilism, has been attempted with glandular transplants, but is more successful either when extracts of the anterior pituitary hormones are injected or when one of the gonadal extracts is used. Similarly, failure of various phases of the female sex function have been treated with one or another of the several ovarian hormones. In both cases, substances from the pituitary and other organs of internal secretion, as well as from the sex glands, are influential in maintaining normal physiological and emotional functioning, and are particularly active during the developmental changes characteristic of adolescence.

While biochemical research on the ductless glands will in time no doubt be of tremendous importance in all the biological sciences, endocrinology has not yet afforded the aid to psychology that its earlier enthusiasts hoped. The talk of "glandular personalities" is on a par scientifically with the ancient humoral doctrine, and the investigations thus far conducted are of limited application.

The hormones are very complex chemical substances, some of them still defying analysis; and, more important still, they do not as a rule act separately, but in various combinations. What is already known, however, reveals that they play a significant part in the growth and maturation of the organism, in various phases of sexual development, and in the energy or lack of energy shown in the performance of physical and mental tasks. These factors are important both indirectly, in respect to the kinds of frustrations the individual may encounter, and directly, in the actual determination of the emotional responses made. It is probably unnecessary to add that glandular treatment is still largely in the experimental stage, particularly for children, who are apt to outgrow many

of the conditions of glandular unbalance, that therapy should be administered only by qualified physicians, and that the teacher's responsibility lies in recommending suspected cases for diagnosis and in dealing with them not as disciplinary but as health problems.

4. Emotional Expression

Emotional Stimuli. Some of the most unfortunate mistakes that people make in judging others are due to errors in the interpretation of emotional attitudes. While it is true that extremes of emotion, like joy and sorrow, are not often misread, the finer distinctions are not so easy to make. Timidity may be taken for pride, a child may be thought to be arrogant when he is unhappy, baffled, antagonistic, and even on the verge of tears. It is small wonder that such errors are made when we realize that, even under carefully controlled experimental conditions, well-trained and experienced people, when they are giving their whole attention to such judgments, make even greater errors. It is wise always to be tentative and modest in one's judgments of the emotional attitudes of others.

The first to make careful, systematic observations of muscle changes during emotional states of men and animals was Charles Darwin, and since his time considerable attention has been given to the problem.[9] The stimuli that originally call out emotional responses have likewise been studied, as well as those which children learn to respond to emotionally. It has been found, for example, that a number of stimuli that were at first thought to arouse fear do not do so. Watson discovered that the striking of a steel bar, or other loud sounds, removal of support, and a slight push or shake when waking or falling asleep elicited the fear responses in infants, and therefore concluded that responses to such stimuli are instinctive.[10] But he also found that the children were not afraid of a dark room, a cat, a pigeon, a rabbit, or larger animals at the zoo. Such findings rather spoil the engaging belief that instinctive fears come down to us from our primitive ancestors who had reason to fear the dark and furry animals, particularly large ones, and instead suggest that children learn to be afraid of such creatures. It becomes quite probable that blood-curdling tales, threats of ignorant parents or servants, and the shrieks of adults who are not masters of themselves when a snake crosses the path or during electrical storms are to be blamed for many of the fears of children, and not their original nature.

[9] C. R. Darwin, *The Expression of the Emotion in Man and Animals,* London: John Murray, 1872.

[10] J. B. Watson, *Psychology from the Standpoint of a Behaviorist,* Philadelphia: Lippincott, 1924.

Similarly, Watson found that hampering of the infant's arm or head movements produced the responses called rage. The so-called love responses, smiling, gurgling, cooing, and sometimes ceasing to cry and extending the arms, were called out by stroking or manipulating some erogenous zone, tickling, shaking, gently rocking, patting, and turning on the stomach across the attendant's knees.

However, it is not all so simple as this. More careful and detailed studies of children's fears have shown that there are wide individual differences, and also that a wide array of stimuli cause young children to respond emotionally.[11] Suddenness of the stimulus seems to be quite as important as its intensity in producing fear, as is also the quality of the sound, and movement in the case of the visual stimulus. Imaginary objects and creatures are often more terrifying than real ones. Furthermore, as children grow older, "something dangerous" becomes a fear stimulus; and, while knowledge of what is dangerous is acquired, it is difficult to discover any conditioning process, as Watson had contended, to account for the responses in particular cases, or for the fact that other aspects of the situation do not produce the fear response. Furthermore, the rage responses are not elicited by holding the infant's arms to his sides when he is in a quiescent or somnolent state, but only when he is moving. Thus the stimulus appears to be frustration instead of any specific situation.

Physiological Responses. The situation is still further complicated when the emotional responses are studied. Watson had described the infant fear responses as "a jump, a start, a respiratory pause, followed by more rapid breathing, with marked vasomotor changes, sudden closure of the eyes, clutching of hands and puckering of lips." Rage was described as crying, screaming, slashing, and striking out; "the feet and legs are drawn up and down; the breath is held until the child's face is flushed." These actions would seem to be easily identifiable. To check on this an experimental situation was set up in which motion pictures were taken of children showing responses to hunger (delay in feeding), fear (dropping a short distance to a pillow), anger (restraint of movement), and pain (needle prick).[12] The pictures were shown graduate students in psychology, who served as judges, but the part of the film

[11] Arthur T. Jersild and Frances B. Holmes, *Children's Fears (Child Development Monographs*, No. 20), New York: Teachers College, Columbia University, 1935. Fears are collected and classified from reports of parents and others and from a series of experimental situations with preschool children. Part IV, Chapter I, is a good summary.

[12] M. Sherman, "The Differentiation of Emotional Responses in Infants," *Journal of Comparative Psychology,* vol. 7 (August, 1927), 265-284, and vol. 7 (October, 1927), 335-351.

showing the stimulus was cut out, so all that the judges saw was the response. They were quite unable to agree on what the "emotion" was, Medical students were similarly at a loss to name the emotion when the actual children were observed, though not the stimulation. And even when the psychology students saw the whole film, stimuli and responses, there was considerable disagreement, though not so much as before. Apparently the physiological response patterns, if they exist, are more flexible than is commonly supposed.

The problem remains of finding some aspect of the emotional response that can be recorded quantitatively, to supplement general observation and subjective report. For this purpose an electric current has been used for some time to detect and quantify what have been interpreted as emotional changes. In most of the experiments, subjects have been placed in an electric circuit with a galvanometer, electrodes being in contact with skin surfaces, and presented with words or other stimuli calculated to arouse emotional responses. The change in the electric current, as indicated by deflections of the needle of the galvanometer, has been referred to as the psychogalvanic reflex, abbreviated PGR. Since the deflections are supposedly the effect of changes in the moisture of the skin due to sweat secretion as controlled by the sympathetic nervous system, the terms skin reflex and, better, electrodermal response, are more appropriately used. The galvanometer is of course not necessary to obtain the response or, with the development of methods for the amplification of minute electric currents, even to observe or record it.

Fascinating as are the recorded curves of psychogalvanic deflections, and in spite of the enormous amount of study the technique has received, interpretations are still very difficult to make. Deflections apparently occur not only when emotions are reported, but also when there is movement, effort, or strain with no emotion, and occasionally they have not occurred when emotion was reported.

Among the first responses to be measured were those made to various stimulus words to which the subject was asked to respond with the first word that came to mind.[13] These words did not give rise to identifiable emotional states, but rather to what might be called startledness or embarrassment, or excitement, but the galvanometer indicated definite intensity differences between them. Such words as "give," "flower," "pond," "pencil," "swim" produced little deflection, while "proud," "afraid," "dance," "wound," "woman," "name," "divorce," "marry," "love," "kiss" (listed in increasing order of the magnitude of deflection) produced the most.

[13] W. W. Smith, *The Measurement of Emotion*, New York: Harcourt, 1922.

Loss of support was used as a stimulus to produce the emotion of fear by precipitating the subject backwards unexpectedly while he was seated in a chair.[14] The first time it happened, the subjects used such words as "frightened," "scared," "startled," "surprised" to describe their condition. Some cried out and made efforts to escape. On a second sitting none of the subjects labeled the emotion "fear," yet the organic responses measured were the same, though a trifle less pronounced. On the galvanometer there was an increased deflection after a latent period varying from half a second to three seconds. Besides, there was an immediate initial acceleration of the heart rate followed by a decided retardation, then a less marked but more prolonged acceleration phase, and finally a subsequent gradual retardation. There was also an immediately retarded respiration rate in nine of the eleven subjects.

The so-called lie detector is in reality an apparatus which accurately records respiratory and circulatory changes. These are likely to occur when the subject is embarrassed by a question he does not wish to answer truthfully. Since the heart and breathing patterns of people differ, and are disturbed by other conditions than telling falsehoods, careful interpretation is necessary.

Facial Expressions. Whatever the validity of introspective reports or galvanometric records, neither method of ascertaining the existence and nature of an emotion is readily employed in everyday life. Instead, facial expression must be chiefly relied upon. A teacher, for example, should be able to detect the signs of rising wrath, of disappointment, of attentive interest, or of dislike and dissatisfaction on the pupils' faces; and some can do this with marked facility. Others, however, seem quite blind in this respect. Efforts have been made to discover the extent of these differences and to chart the improvement of individuals in this ability.

Subjects are presented with series of pictures of faces, each supposedly expressing some emotion.[15] Great individual variations are found in interpretation as is shown by the fact that one expression was named resentment, but was called variously fear, sadness, surprise, retrospection, given up hope, thought, endurance, hopeless suffering, haughtiness, and despair. In an experiment designed to study "social perception,"[16] the

[14] W. E. Blatz, "The Cardiac, Respiratory and Electrical Phenomena Involved in the Emotion of Fear," *Journal of Experimental Psychology*, vol. 8 (April, 1925), 109–132.

[15] C. A. Ruckmick, *The Psychology of Feeling and Emotion*, New York: McGraw-Hill, 1936.

[16] G. S. Gates, "An Experimental Study of the Growth of Social Perception," *Journal of Educational Psychology*, vol. 14 (November, 1923), 449–461.

child can hardly be blamed who interpreted the "horror" pose, with its wide-open mouth, as "yelling upstairs." However, definite age differences in ability to interpret the pictures were discovered, though the order of difficulty of interpretation of adults differed from that of children. Sex and social differences were not evident. Motion pictures permit the time dimension to be added to the stimulus situation, though the results with infants, as already described, are similarly equivocal.

One reason for the lack of unanimity in the discrimination of the different emotions is to be found in the fact that no pattern of facial expression (except smiling) has been found to characterize any emotion either for individuals or groups of individuals. In fact, the responses of the whole body musculature for the different emotions are fundamentally alike, though the faith in the existence of real differences is not unjustified. A second reason, and this applies to the "staged" pictures only, is that there is no assurance beyond the word of the person photographed that the pose exhibits the emotion intended. Even a concensus of judgments would establish only the existence of a conventional stereotype such as may be familiar on stage or screen but seldom met with elsewhere. The third reason is that the emotional response is only a part of the total situation in connection with which it can ordinarily be interpreted. Those who "misjudged" the posed pictures placed the various distorted expressions in a context of their own, in which many of the judgments were correct. One must be aware of situations which might call forth certain kinds of emotional responses, preferably be well enough acquainted with an individual to recognize his recurring changes in expression, and also be carefully observant, if he is to become an adept at reading the mind's construction in the face.

5. Emotional Attitudes

Emotion and Frustration. It has been pointed out that emotions, like other experiences, have an affective tone of pleasantness or unpleasantness, but that feeling does not serve as a basis for differentiating subjective emotional experiences. It has also been shown that emotional responses are physiological responses, but that the behavior patterns likewise constitute an unsatisfactory basis for discriminating among emotional states. If, however, emotion is thought of as appearing in response to situations which interrupt or interfere with the process of goal-seeking, it becomes clearer that the significant distinctions between emotions are to be found in their relationship to satisfaction and frustration. Happiness and a feeling of well-being accompany the progressive attainment of desirable goals. Variations occur at different times when the individual

(a) Prospective Emotion

Enthusiasm
Anticipation
Confidence
Determination
Hope
(Curiosity)

(Timidity)
Worry
Anxiety
Dread
Despair

(b) Immediate Emotion

Rage
Anger
Excitement
Annoyance
(Startle)

(Uncertainty)
Shyness
Fear
Fright
Terror
Collapse

(c) Retrospective Emotion

Elation
Delight
Joy
Satisfaction
(Relief)

(Daze)
Disappointment
Regret
Sorrow
Grief
Anguish
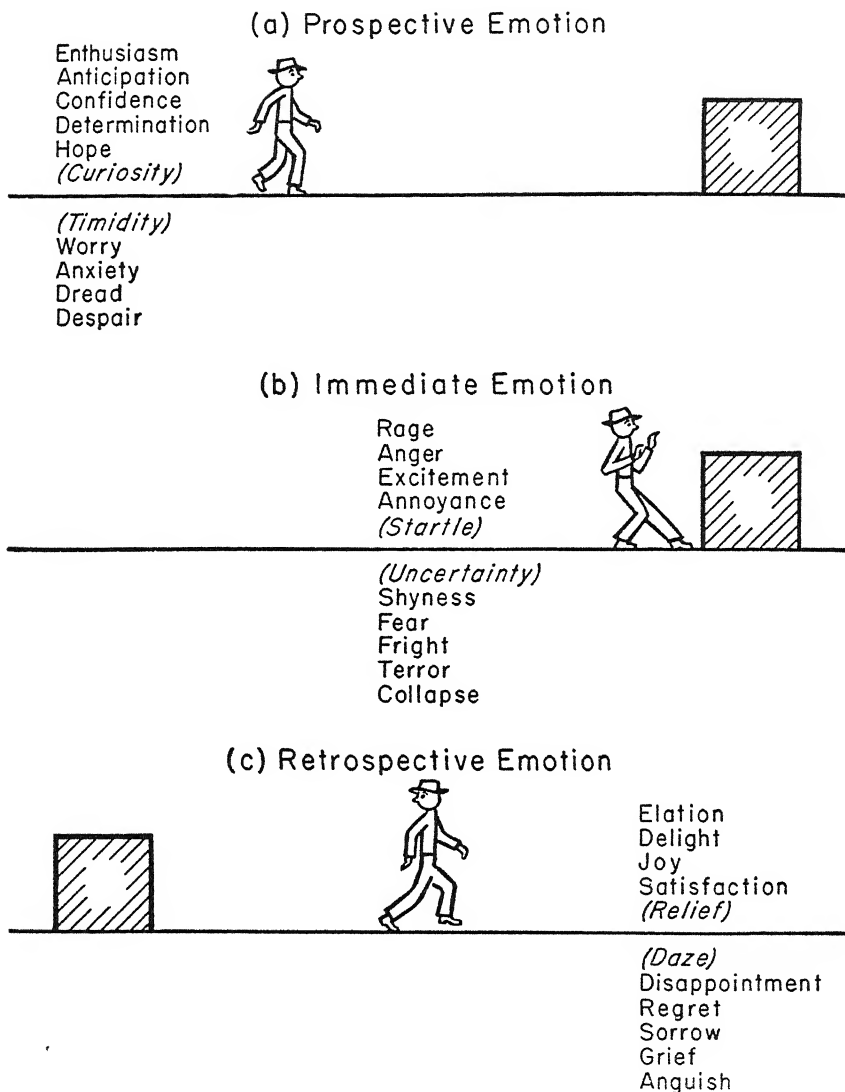
Figure 8. Emotions and Frustrations. Above the lines: Positive — success anticipated, assumed or achieved. Below the lines: Negative — failure anticipated, assumed or experienced. Parentheses suggest a neutral or intermediate state, while distance above or below the line roughly indicates degree of intensity.

has no adequate response mechanism ready to cope with the situation that confronts him. Such a situation produces frustration.

For convenience, frustration may be thought of as in the future, immediately present, or in the past. Such a differentiation does not do justice to the variations of emotional attitude deriving from unexpectedness, variation in the nature of the thwarting conditions, and the changes that the structuring of the total situation undergoes as the individual gains in knowledge and experience. But it does serve to focus attention on three classes of emotional response with which all are familiar, and with which teachers have frequently to deal.

Prospective Emotion. Correctly speaking, an emotion is a matter of the present, not of the future or past. But when the individual contemplates probable success or failure in the satisfaction of his desires and needs, any emotion he may feel may be called prospective. It may be classed as positive when success is expected, or foreseen, and negative when failure is anticipated, with an intermediate area of indifference or uncertainty between (Figure 8, *a*).

On the negative side, emotionality ranges from worry, anxiety, and dread, when the issue remains in doubt, to despair at the prospect of failure. The term anxiety has been used to include the various negative intensities of prospective emotion, and much clinical work has been done in this area. It has been viewed by some as deriving from shock or traumatic experiences of the past which produce the typical uncertainty, doubt, or anxiety concerning the occurrence or outcome of any future events. Others maintain that expectancy of future frustration provides sufficient explanation. For normal people, however, worry or anxiety about what the future may bring forth is so familiar that many proverbial phrases have built themselves into common speech pointing out the unwisdom of borrowing trouble and crossing bridges prematurely. Once the habit has become ingrained, it is useless to tell people not to worry; more intensive treatment is necessary. For children, however, steps can be taken to temper the wind and build up the habit of success, or to teach them to plan ahead so as not to run unnecessarily into danger. Anxiety may, of course, derive from conditions at home about which the teacher knows nothing, and may result in inattention, poor scholarship, and in various physical symptoms such as loss of sleep and loss of appetite, with their further undesirable consequences. When the strain continues over long periods the symptoms are apt to increase in number and intensity.

But the school itself concentrates many obstacles in the path of its

pupils—the difficulties of adjusting in a new school grade, or club, various kinds of public appearances that are terrifying to many, such as athletic events, dramatic exercises, and speaking contests, and, perhaps most serious of all, the many recitations, quizzes, and examinations. Children's dread of approaching examinations is sometimes too intense, and a "nervous breakdown" is too much to offer for a school diploma. Care should be taken against crowding children into situations in which the consequences of failure are severe.

While there may be something wholesome about a challenge, and while the experience of occasional failures may have a salutary influence, the development of an attitude of anxiety and despair can hardly be considered a worthy educational objective. It should, perhaps, be added that, while it is criminal to urge a pupil to attempt what is beyond his powers, it is equally criminal *not* to encourage one who may have despaired too soon. The art of teaching is never more exacting than in the discovery of just the difficulties needing clarification and the provision of assistance and encouragement in tasks which pupils have the ability to complete.

Close to the line of demarcation, when the situation is relatively unstructured, we find an uncertain curiosity and timidity. When such behavior appears, it calls for direction and encouragement, if the path is sufficiently safe for the child to follow.

On the positive side, in which success is foreseen, prospective emotions range from hope, through determination, to confidence, anticipation, and enthusiasm. When a person merely hopes he will succeed, the issue is still in doubt—so much in doubt, in fact, that he is likely to remain passive, without exerting himself to attain the desired goal. The same state of passivity may accompany an attitude of faith, where dependence upon others may take the place of individual initiative and enterprise, whether there is any rational basis for the faith or not. Determination, on the other hand, is active, even though doubt concerning the outcome still remains. With confidence, doubt is largely removed, even though there are apparently various stages or levels ranging from uncertainty to perfect assurance.

If a pupil knows that he knows, if he is conscious of his powers without being overconfident, whatever is ahead—examination, game, speech, debate—he looks forward with anticipation and enthusiasm. The man who loves a fight, be it in the pugilistic or political arena, is more familiar with the elation of victory than with the disappointment of defeat. Enthusiasm in school is to be obtained, not by sugar-coating methods, but by the selection of worth-while tasks that are difficult, but which at the

same time hold out to the pupil the promise that success will crown his efforts.

The effect of prospective emotions on school work is noticeable not only in the case of pupils but of teachers as well. In fact, a teacher who is in a state of anxiety may easily create an undesirable classroom atmosphere and even communicate the same emotion to the pupils, though the causes may be far removed from the school activities. They may, of course, be due to a fear of disciplinary situations that may arise, to a feeling of incompetence, and to uncertainty about the prospect of holding the job. Or they may be prompted by health conditions, financial difficulties, or family misfortunes. Obviously, the schoolroom atmosphere is more wholesome if the teacher's prospective emotional attitudes are positive. Confidence inspires confidence, and enthusiasm in harmony with the occasion carries the work along over the less interesting stretches when otherwise it might stall in a slough of despond.

Immediate Emotion. What may be called immediate emotional responses (Figure 8, *b*) occur when the obstacle is right in one's path, especially when it appears suddenly or unexpectedly. Of course no sharp time line can be drawn between the prospective and immediate emotional attitudes. If a pupil shows anxiety, or confidence, about a coming examination, the emotional state will be present on and off and in varying intensities up to the time the papers are distributed, when there may or may not be a change as the actual situation takes the place of the imagined one. If the stimulus situation recurs, the intensity of the emotion and its affective tone may reappear, or, with greater familiarity, it may decrease or disappear.

Negative emotional responses range themselves along an intensity gradient from a very mild form that can be called shyness, to the more intense forms of fear, fright, and terror, with a greater sympathetic involvement and less voluntary control of behavior. The most intense form, collapse, occurs only in most extreme cases. While a sudden loud noise and loss of support are basic fear-producing stimuli during infancy, any sudden or painful stimulus may have the same effect, as may also strange or unfamiliar objects or persons. In general, experience reduces such fears, while others are aroused by objects that cause the child to anticipate trouble or danger, owing to what he may have learned or imagined. The basic nature of fear is to be found in avoidance or escape, though in animals and human beings it may become a paralysis which inhibits escape movements.

Milder forms of fear often handicap children of school age, and per-

haps will become lifelong companions without sympathetic but determined cooperation on the part of the teacher with those so afflicted. Greater intensities of fear are less frequently met with, and when present may often be traced to childhood experiences which have produced a lowered threshold of response. The same is true of the *phobias*, or abnormal fears, such as the fear of cats, of running water, of inclosed or open spaces, of high places, and the like, with which otherwise normal people are sometimes afflicted. A person may be only inconvenienced by these, or, in their more intense forms, he may be in agony, yet quite powerless to help himself.

Children sometimes harbor fears quite unknown to their parents or teachers. Dark rooms, snakes, mad dogs, fires, school bullies, strange men, burglars, strange noises at night, sleep-walking, and desertion by parents are sometimes feared very intensely, some of them prospective and fancied. Such fears, real or imaginary, often stand in the way of a child's happiness and contentment. They may explain his aversion to certain things, such as going to school or to bed. And, having been taught that it is unmanly to be afraid, he may suffer in silence.

Close to the line of demarcation, uncertainty appears, hardly an emotional state in itself, but clearly recognizable in the hesitant and wavering behavior often observed when there is a choice of objectives or when the total situation is not completely structured and has elements of positive and of negative valence. If the stimulus is sudden and intense, varying degrees of shock may result. These have been classified as minor, medium, and major. The immediate response to such stimuli, as, for example, to the report of a gun, is the startle reflex, which involves such responses as winking, tension of the skeletal muscles, and sudden changes in heart rate and respiration.

The positive, or anger, responses likewise vary in intensity. The mild form is annoyance, in which the individual is "peeved" or resentful at being hindered, but discounts the importance of the interruption. Excitement implies that the situation is not completely understood or structured, and the possibility of failure is recognized though it is not regarded as serious. Like many of the other common words for emotional experience, it is far from specific, including varying degrees of intensity and ranging from an undifferentiated, neutral condition to a more uncontrolled anger and even enthusiasm. Anger suggests aggressive behavior, a partially repressed belligerency, while rage, which is still more intense, is like terror in that there is a larger degree of involvement of the sympathetic nervous system with a loss of the finer automatized responses and more of a tendency to suspend rational judgment.

It is most unfortunate when a teacher or administrator arouses the anger responses in the pupils. It can be done very easily and quite unnecessarily by thwarting some legitimate pupil need or desire, or by officious refusal of a perfectly natural request ("You can't because I say you can't!"), or by cutting sarcasm and other forms of insolence that lessen the regard in which he is held by his fellows. Of course, a pupil cannot always have his own way: others have to be considered; and so, even with courteous fair dealing, anger will occasionally arise. It can sometimes be forestalled by pointing out the fairness of the refusal or the regulation. If this fails, the anger should be given time to cool, when the whole matter can be talked over in a friendly fashion.

Unfortunately, children are not the only ones to act emotionally. The many frustrations to which adults are subjected often produce angry retorts which call for later apologies. Children become quite adept, sometimes, at smoothing the ruffled feathers of an angry teacher, and it may be that such experience will be valuable to them in later life. However, a teacher who loses his temper is apt to lose the respect of his pupils, and his influence with them is slight. The love of learning is not cultivated in this manner. It seems probable that the anger threshold is lowered by continued strain, by atmospheric conditions (heat and humidity), and by physiological conditions (hunger and loss of sleep). It has been observed that more spankings occur at home in the afternoon between five and eight o'clock than at any other time, when children need rest or food or sleep and when parents are somewhat worn out by the day's work.[17] Someone has said that children always behave the worst after a teacher has been to a late party the night before. There is sufficient truth in these observations to warn parents and teachers to be on their guard. Certainly, the teacher as case worker would not be expected to handle his clients' cases angrily. Indeed, it is as inappropriate and unethical for a teacher to become angry at a pupil as it would be for a physician to fly into a rage at a patient.

Retrospective Emotion. After the obstacle has been met, the emotion is one of satisfaction or disappointment according as one has succeeded or failed in overcoming it (Figure 8, *c*). On the negative side, if a person fails in what he sets out to do, there may be only a mild feeling of disappointment or regret. Or, if his longing was great and his loss irrevocable, he may be overcome by sorrow or grief, which may in turn become anguish. The tears of the Homeric heroes, even at the death of

[17] Florence L. Goodenough, *Anger in Young Children,* Minneapolis: University of Minnesota Press, 1931.

their beloved companions, strike the modern lad with surprise, for he has been taught not to give way to his feelings. His little sister has, as a rule, met with greater lenience, which may possibly be the reason for her more frequent outbursts. Failure on examinations, with consequent loss of standing at school or at home, is a familiar cause of grief to children of school age, while social and athletic failures contribute their share. The school has done much to build up negative attitudes with its examinations, which are not always of the fairest, with its too frequent failure to provide able instruction and understanding instructors, its undue emphasis upon "passing" and graduation for the unqualified, and with its insufficient flexibility in adapting to individual differences.

However, the pupil's sorrow or grief may stem from sources outside the school, and not be recognized for what it is by the teacher. He may have lost a member of the family, or have been sent by his parents to live with someone else, or by a social agency to a foster home. His security may have disappeared, or he may be baffled by a new environment and overcome by homesickness. The latter, sometimes called nostalgia, is one of the most severe emotional upsets with which teachers have to deal, particularly in boarding schools and camps. The children are overwhelmed with uncontrollable grief, which even when met with the most sympathetic and understanding treatment is sometimes cured only by a return of the child to his parents. Fortunately, few children suffer so severely, and most of them get over it in a few days.

Close to the line of demarcation between grief and joy is the undifferentiated attitude of relief. The individual may be somewhat dazed, and his emotions are confused since in retrospect the crisis was bad but it is now over. A sudden narrow escape from danger to himself or to a son or daughter may leave a person hysterical and almost in a state of collapse. If the trial was long and severe, time to recuperate is needed, with complete relaxation. Coaches know the importance of elapsed time between events in a track meet or between contests, and the reasons are not all physical. Rest periods, lunch hours, week-ends, holidays, and vacations in the normal social organization testify to the importance of time for relaxation from the frustrations and strain of continued activity.

On the positive side, nothing affords greater satisfaction than the realization of the successful completion of a difficult task. Here is that joy of workmanship which some psychologically inclined economists talk about; here, one of the strongest arguments for dividing a pupil's day into work units instead of "hours"; here, the main reason for the success of the problem-project method. Perhaps if children were given

more opportunities to do things themselves, so that they could experience as much joy in their accomplishments in the high school as they did in kindergarten in coloring a Christmas card, they would not, when grown to adulthood, be so dependent on being amused or entertained by others. Satisfaction in the accomplishment of a task well done, genuine as it is, and so nearly universal if given half a chance, is all too likely to be snubbed out of existence by the thoughtless teacher, tired with the day's routine and oppressed by the all-embracing ignorance of his pupils. It is, however, one of the surest ways of promoting cheerfulness and good will among the members of a class; and, if the task is recognized as difficult and the consequences of success important, joy—not to say elation—accompanies its successful accomplishment.

Emotion with Personal Reference. The emotions thus far discussed arise whatever the conditions of frustration may be. Another group of emotions appears when the attitude of the individual is directed not so much toward the fact of frustration as toward the persons involved. One direction of reference is toward *those affecting the frustration* in one way or another. The positive emotional attitudes are directed toward those who assist or cooperate in one's own efforts to satisfy a desire or need, and range from mild tolerance through appreciation and gratitude to liking, love, and devotion. The negative personalized emotions are directed toward those who are thought to cause the frustration and so interfere with the satisfaction of a desire. The hostility may range from dislike through aversion to hatred. In either case the goal may be transferred to the persons concerned, producing on the one hand an erotic fixation, and on the other spitefulness, retaliation, or revenge.

A positive attitude on the part of pupils toward their teacher is obviously desirable in that it produces a spirit of cooperation which makes for less friction and greater enjoyment. It is, however, sometimes sought by teachers for its own sake. They like to be liked; and, while they may be successful in attaining popularity, their influence may not be good. The difference lies primarily in the nature of the pupil desires they help to further. The genuinely well-liked teachers are those who help the pupils when the help is needed in the attainment of the goals all the pupils recognize as desirable and worthy. It is a difficult balance, which must be maintained, however, since the teacher also assigns the lessons and sets the examinations—that is, produces the frustrations. Many teachers find it easier to thwart the pupil's need for recognition and effective effort and thus build up attitudes of dislike and aversion than to help open the way of accomplishment and successful attainment.

Emotional attitudes toward *others when they are frustrated* are worthy of note. On the negative side are those who are disliked, who, if they are unsuccessful in overcoming frustration, are looked at with varying degrees of smugness, snobbishness, repugnance, disgust, or scorn. If they are successful, the attitudes change to detraction, resentment, jealousy, or envy, and their successes are belittled. Disliked pupils rarely get the credit that is their due. On the positive side are those who are liked, who, if they are unsuccessful in overcoming frustration, are looked at with pity, sympathy, toleration, or even benevolence. If they are successful, the attitude becomes patronizing, or one of pride and satisfaction. Teachers are apt to take pride in, or even credit for, the achievements of their successful students. However, individuals differ in their objectivity under such circumstances, some maintaining a position of aloofness and superiority, others emphatically sharing the sorrows and joys of those about them. Obviously, the positive attitudes are more wholesome in the classroom or elsewhere.

Emotional attitudes toward *oneself when frustrated* are also familiar, and may be so constant as to become traits of personality. On the negative side are the failure attitudes of inferiority, discouragement, and dejection, as well as various degrees of self-involvement including shame, embarrassment, and remorse, which involves feelings of guilt and desire for expiation. On the positive side are the success attitudes ranging from humility and modesty to self-satisfaction, complacence, and self-confidence. The less desirable extreme forms are pride, vanity, and self-glorification—"swelled head" in the vernacular. There is no particular objection to the latter condition except that people don't like it, and it may therefore produce added difficulties and frustrations. So a recognition of the relative unimportance of one's achievements may properly be inculcated. But a negative attitude tends to paralyze further effort unless compensatory mechanisms become operative, until sufficient encouragement to continue striving toward more wisely chosen objectives can be provided.

This rather lengthy analysis of emotional attitudes as a consequence of frustration has been presented for two reasons. The first is to call attention to their existence so that the teacher may make it a point to look for them and to take them into account in dealing with his students. The second is to emphasize the importance of the adaptive behavior that follows frustration, of which the emotion is a part. This adaptive behavior is described in the next chapter. But, first, the relations of emotional development to the process of maturing and the characteristics of certain complex emotional states will be discussed.

6. EMOTION AND MATURATION

Childhood Emotion. The individuation of the more or less discrete emotional attitudes like those described above takes place gradually and is not found during the early stages of a child's development. A number of studies made with the help of motion pictures have revealed that the emotional behavior of infants is so generalized that particular emotions cannot be identified, though even during the first month differences can be detected in observed behavior and in the cries that are made.[18] By the end of the first year, however, the adult patterns are quite clearly indicated, and differentiation proceeds rapidly.

According to one theory, based on repeated observations, out of an undifferentiated excitement at birth, distress and delight are first individuated by the third month.[19] By the twelfth month, fear, disgust, and anger emerge from distress, and elation and affection from delight. As children grow older, emotional development may be recognized by noting such criteria as the following: (1) Emotional responses decrease in frequency and intensity; (2) they transfer gradually to situations which are socially approved as determined by experience; (3) they change so far as their overt expression goes to those forms of emotional behavior that harmonize with training and social pressures.

The emotional habits of the child differ from those of the emotionally mature adult. Some of these differences have been identified as follows:[20] (1) The adult is more tolerant of discomfort and frustration; he doesn't kick and scream whenever he doesn't get what he wants. (2) He reacts emotionally less frequently and less intensely. (3) His emotional responses are less impulsive, less explosive, and more apt to be delayed. (4) He has less self-pity, less of the "poor me," or "you'll be sorry when I'm dead" attitude. (5) His emotional responses are less overt and obvious. It is interesting that there are mentally disturbed conditions beyond the ends of both these extremes—those who show no emotion whatsoever, and those who exhibit a frenzied emotionality.

[18] M. Sherman, *op. cit.;* F. L. Goodenough, "The Expressions of Emotions in Infancy," *Child Development*, vol. 2 (June, 1931), 96–101; A. Gesell, *Infancy and Human Growth*, New York: Macmillan, 1928; C. Bühler, *The First Year of Life*, New York: Day, 1930; K. M. B. Bridges, "Emotional Development in Early Infancy," *Child Development*, vol. 3 (December, 1932), 324–341.

[19] K. M. B. Bridges, "A Genetic Theory of Emotions," *Pedagogical Seminary and Journal of Genetic Psychology*, vol. 37 (December, 1930), 514–527; *The Social and Emotional Development of the Pre-school Child*, London: Kegan Paul, Trench, Trubner, 1931; "Emotional Development in Early Infancy," *Child Development*, vol. 3 (December, 1932), 324–341.

[20] P. T. Young, *Emotion in Man and Animal*, New York: Wiley, 1943, pp. 185–188.

Emotional Fixation and Regression. Stages of emotional development have been delineated based on emotional conflicts or fixations. Genetically, the first of these is the *birth trauma*, the shock to the organism caused by the loss of fetal security and entrance into the cold competitive world. The second conflict situation results in what Freud termed the *Oedipus complex*, which elaborates the doctrine of infantile sexuality that brought such a weight of sanctimonious criticism down about the ears of the father of psychoanalysis. Just as in the Greek myth Oedipus unwittingly slew his father and married his mother, so, according to this doctrine, the manchild loves his mother, the source of all his food and care; but he hates his father, whom he sees as a rival for his mother's affection. The similar fixation of the girl upon her father is sometimes called the *Electra complex.* This conflict, with ensuing family maladjustments, the Freudians point to as an important cause of mental disturbance. At this stage, the infant must make the break from his earlier, parasitic dependence on his parents.

The third is the *narcissistic* stage of exploratory interest in his own body, the name being taken from the Greek myth according to which Narcissus fell in love with his own reflection in a pool. Following the stage of self-love is the fourth period of conflict, that of *homosexual* attraction, in which the child gradually comes to find enjoyment in others of the same sex—the "gang age." The last period is that of *heterosexual* attraction, or interest in those of the opposite sex. These five stages are normal, and the danger lies not in their existence but in the failure to transfer from one to the next, for a continuation of one or another into adult life makes it impossible for the individual to become a normally adjusted man or woman.

If a person does not develop beyond one of these stages, he is said to be *fixated* at that stage. Or he may have passed beyond it and then, owing to some kind of shock, perhaps, return to the earlier stage, which is spoken of as *regression.* This may be noted in a mild form in the case of children who are ill in that they often prefer toys which appealed to them earlier, but which it was thought they had outgrown.

Emotional Maturity. While as a rule people who grow older become emotionally more mature, many children are better developed emotionally than many adults. The stages of emotional growth are difficult to determine and depend in part upon the demands of the culture. However, there are certain conditions or phases of emotional experience in respect to which varying degrees of emotional maturity may

be noted.[21] These may be classed under the headings: stimuli responded to, responses made, and the recognition of causality.

If an individual responds emotionally to *stimuli* appropriate to his age group, to that extent his emotional development is normal. We don't expect twelve-year-olds to throw tantrums or enjoy playing with dolls, or young people of college age to play with toy trains and building blocks or become devastated by movie stars and radio crooners. The emotional maturity of college alumni whose enthusiasms still center in college athletic contests is sometimes questioned.

Then, too, the emotional *responses* should be appropriate in type and intensity to those of the age group to which the individual belongs, if he is maturing normally. Excessive laughing, giggling, talking, shouting, crying and sobbing over relatively unimportant matters is evidence of a lack of control and the inability to bear tension that is characteristic of immaturity. Men who are oversentimental about their mothers have probably not progressed beyond the Oedipus stage, while women who lavish affection on their little dogs, or alternately scold their children and shower affection on them, though they give the appearance of being "grown-ups," are emotionally just little girls in pigtails. Similarly, acts of displaced aggression, such as kicking chairs one bumps into, becoming angry at employees who are acting on orders, spanking children to relieve one's own anger, and the like, are illustrations of emotional immaturity. Probably excessive ego-involvement should also be included. If one can view a situation objectively when it is his own dog the neighbor complains about, or his project or his relative who is criticized, he is more mature than the one who always "takes things personally," and refers all comments, criticisms, and evaluations to himself.

The other criteria of emotional maturity are cognitive and grow out of the ones just discussed. The mature person sees or looks for causes and consequences objectively and sees his frustrations and successes as due to natural events instead of giving them an animistic or a supernatural interpretation. He is not hopeful of providential consideration and then grieved because he does not get it; nor, if he has good luck, is he overjoyed that he is especially singled out for divine favors. Similarly, he recognizes the consequences of his acts and those of

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[21] L. B. Cole, *Attaining Maturity*, New York: Farrar and Rinehart, 1944, p. 51; W. S. Sadler, *Theory and Practice of Psychiatry*, New York: Mosby, 1936, pp. 419–420; Fred McKinney, *Psychology of Personal Adjustment*, New York: Wiley, 1941, pp. 500–501.

others and, so far as possible controls his behavior and his environment so that he and others will not be caused undue unhappiness.

There is danger of thinking of the emotionally mature as withered and dried-up personalities with no emotional life at all. Such, however, is not the case. Instead, they should be expected to have a depth of emotional warmth and sympathy, the capacity to feel deeply, to share the experiences of sorrow and joy to the full.

7. COMPLEX EMOTIONAL STATES

Mood. If a mild emotional state is prolonged beyond the time when the occasion for its presence seems to have passed, the condition is called a mood. Contrary to the idea of being sad as implied by the common term, moody, a mood may be joyful and merry, gay, affectionate, and devoted, as well as depressed or antagonistic. The reason for the presence of these emotional hangovers, to which some are more susceptible than others, is not known, though physical and perhaps glandular conditions, coupled with certain kinds of frustrations and repressions, are probably responsible. Prolonged moods of depression are not a sign of good mental health. In the mental disease called manic-depressive psychosis the patient alternates between a very depressed state lasting for a shorter or longer period and the opposite excited or manic stage, though he may become fixated at some point along the line. But the moods of most normal people are far less severe. They have learned to cast off their fits of depression during the childhood period, helped no doubt by such homely advice as "Get over it," or "It won't last; nothing does," or by finding themselves neglected by their friends.

There seem to be no useful generalizations in the treatment of moodiness in children except, perhaps, to try to discover the cause and act accordingly. Such action is usually more effective if it reveals sympathy and understanding rather than antagonism, even though belligerent and sulky moods are highly exasperating. If it is remembered that such a negative mood is evidence of frustration, that is, failure in adjustment, the need for help instead of further frustration becomes apparent. It goes without saying that teachers, who may themselves be subject to moody spells, if they cannot completely control them, should be able to recognize them and learn to act as rationally as possible in spite of them.

Temperament. The term temperament refers to certain characteristics of an individual, including feelings, moods, and emotional atti-

tudes that he tends to exhibit consistently. The derivation of the long-standing classification of temperaments from the humoral doctrine was mentioned in connection with discussion of the endocrines. It was Galen (c. A.D. 130–200) who connected the bodily fluids with the respective temperaments—sanguine, choleric, melancholic, and phlegmatic. Wilhelm Wundt (1832–1920) elaborated the meaning of these as combinations of quickness and strength. Thus, for example, the sanguine man is quick to respond, but is shifting, unsteady, lacking in force; the melancholic man is slow in getting under way, perhaps, but is not easily moved, and so on.

The so-called "temperamental" person is one with a volatile temperament, regularly showing a high degree of emotionality, that is, a tendency to respond to all situations with more emotion than is usual in the culture. It is possible to establish a kind of emotional gradient. At one extreme are the stolid, phlegmatic, "unemotional" individuals, while at the other are the labile, volatile, or emotionally expressive. There is no means of comparing the actual conscious emotional experiences of such persons; but there is no reason to believe that the more stolid, less emotional types do not feel as intensely as those whose emotional states are more obvious. Their emotional attitudes are often less easy to interpret, however; so whether they are pupils or teachers, they stand a better chance of being misunderstood.

Qualitative temperamental differences have long defied satisfactory classification, though from ancient times they have influenced the delineation of character "types." Relationships between temperament and body build have often been noted—the typical "jolly fat man," for example, and the dangerous people with the "lean and hungry look."

Kretschmer sought to classify these, using anthropometric measurements.[22] He described three main types, the pyknic, the asthenic, and the athletic. The *pyknic* is stout, with a round face, "pronounced peripheral development of the body cavities (head, breast and stomach) and a tendency to a distribution of fat about the trunk." The *asthenic* (or leptosome) is slim, characterized by a "deficiency in thickness combined with an average, unlessened length," with an angular profile and long nose. The *athletic*, or muscular, is a kind of subgroup of the asthenic, characterized by "strong development of the skeleton musculature." The *dysplastic* are those showing such irregularities of development as to prohibit their classification in the above categories. Indeed, Kretschmer wrote, "It must be noticed here that a sharp line

[22] E. Kretschmer, *Physique and Character*, New York: Harcourt, 1925.

can obviously not be drawn between the individual types, and that therefore the distribution of borderline cases can never be exact."

The study of temperament in relation to physique has been carried further by Sheldon, who has delineated three somewhat similar body types on the basis of seventeen diameter measurements.[23] Each body type likewise has a corresponding temperament type. Sheldon solved the difficulty of borderline types by a system of classification that permits the numerical designation of various deviations from the pure type.

The three body types are called by Sheldon the endomorph, the mesomorph, and the ectomorph, so named from the dermal embryonic layers from which the viscera, the body structure, and the nervous system, respectively, develop.

The temperament of the endomorph is called *visceratonic*. He is usually fat, his body is soft and has rounded contours, and his digestive viscera are highly developed. He loves food, relaxation, and bodily comfort. One father of an extreme visceratonic said that the only exercise his son took voluntarily was swallowing. He is sociable, amiable, complacent, and greedy for affection and approval. He needs people when troubled and is oriented toward childhood and family relationships.

The temperament of the mesomorph is called *somatotonic*. His somatic structures, bone, muscle, and connective tissue, are well developed. He may or may not be an athlete, but he is sturdy and erect, hard, firm, tough, and thick skinned. The somatotonic rejoices in muscular activity and vigorous bodily exercise. He loves power, risk, danger, and aggressive competition. He is callous and ruthless, and indifferent to pain. He is usually noisy, has a loud voice, is overmature in appearance, and when troubled needs action—vigorous exercise or perhaps a fight. His orientation is away from childhood and toward the goals and activities of youth.

The temperament of the ectomorph is called *cerebrotonic*. He is of slender, somewhat fragile build, apt to be tall, with flat chest, delicate bones, and weak muscles. He is restrained and inhibited, and avoids attracting attention, usually successfully, yet he himself is hyper-attentional, observing what is going on and annoyed by distractions. He loves privacy, and keeps things to himself. He dislikes groups of people and is uncomfortable in their presence, prefers his room to the out-of-doors, and is quiet and soft-spoken almost to the point of being inaudible.

23 W. H. Sheldon and S. S. Stevens, *The Varieties of Temperament: A Psychology of Constitutional Differences*, New York: Harper, 1942.

He is hypersensitive to pain and has poor sleep habits, yet maintains an intent youthful appearance. He prefers solitude when troubled, and is definitely oriented toward later periods of life.

Twenty characteristics of each type, such as those mentioned above, have been drawn up, on each of which an individual may be rated on a seven-point scale, giving him a total raw score which is translated to a numeral. The numerals range from 1 to 7, 1 being low and 7 high for each type. Thus an extreme visceratonic would be 7-1-1, an extreme somatotonic 1-7-1, and an extreme cerebrotonic 1-1-7. The majority of people have some of the characteristics of more than the one type which predominates. Hence an easy-going hermit might be 4-2-6, or a sensitive athlete 2-5-4. All three temperamental characteristics may be found at all intellectual and social levels.

In an aggressive and competitive culture, which is reflected in the school society, the visceratonic will have greater difficulty in attaining success than the somatotonic. Yet the latter's success will more likely be on the athletic field than in the confines of the schoolroom where he can probably be counted on to make a lot of trouble for the teacher. The cerebrotonic will have little difficulty there, whether he is bright or not, but he will probably get a low mark in gymnasium.

It seems clear that none of these characteristics is bad or good in itself, but a realization that they exist in varying amounts will add to the understanding of the teacher, guidance worker, or administrator and enable him to provide more intelligent treatment than he otherwise might, and not be too much discouraged by failure, or too hopeful of success in molding the temperaments of those he has in his charge.

Sentiment. The name sentiment is sometimes given to any one of a great number of complex, vaguely defined emotional attitudes. Some at times are overpowering in their strength—wonder, awe, admiration, or adoration, for example. Some are the personal patterns of dislike or affection for the many kinds of human relationships which abound in a normal society. Sentiment is not to be confused with sentimentality, the latter being a kind of banal, overexpressed or overemphasized affection for the persons or things it is usual to have affection for. While teams and cheer leaders are rather successful at building up the sentiment of school spirit, and religious and patriotic organizations develop religious and patriotic sentiments, professional education has been rather neglectful of this phase of pupil development.

8. Emotions and Education

Emotions Are Responses. The schools have tended to emphasize the linguistic skills and to overlook the emotional life of pupils, thinking of it perhaps as a nuisance, requiring disciplinary handling, or at best something that calls for the capacity to overlook and endure. Instead, it should be regarded as a fundamental physiological response mechanism influencing life adjustment, without due regard for which the ordinary school tasks may become futile and silly. The emotional responses are functions of the adjustment processes by which the needs of the organism are satisfied. They may become harmful and disruptive if needs are violently or consistently frustrated, or they may facilitate and give value and meaning to the whole learning process.

Emotional Responses Have Meaning. The second important fact about emotional responses is that they have meaning, they provide a basis for the interpretation of the life adjustments of the individual. From the teacher's point of view they may be thought of as adjustment meters to be read and interpreted. The reading is not easy sometimes, and misinterpretations are easy. The child who is judged to be spiteful and rude may be lonesome and baffled; the one who is polite and friendly may be malicious and revengeful. One must understand children, and look behind the surface manifestations to the probable needs and frustrations that produce them.

Emotional Responses Are Complex. Some of the basic emotional attitudes have been briefly delineated, but there are many variations with age, total personality, and circumstances. Children outgrow their childish emotional expression and gradually develop habitual emotional responses which are a part of and characteristic of their personalities. And external circumstances such as the time of day, the temperature and humidity, as well as internal factors such as fatigue, amount of sleep, and general condition of health and metabolism produce variations in emotional quality and intensity. Furthermore, conflicting emotional attitudes toward various phases of the social environment produce an untold number of permutations and combinations which novelists have delighted in describing, but which still defy systematic delineation. And perhaps more important than all are the effects of continued tension resulting from numberless frustrations. George Bernard Shaw once wrote: "In a prison they may torture your body. But they do not torture your brains, and they protect you against violence and outrage from your fellow prisoners. In school

you have none of those advantages." Allowing for Shavian exaggeration, it is well to realize the nature of the strains under which some children live.

Emotional Responses Are Modifiable. The normal processes of development bring changes in emotional expression, with the result that what is normal for one age group reveals emotional immaturity if it appears later. But the process of development is furthered or hindered by the kind of environment in which the child lives. He tends to adopt the behavior of those about him, and if he continues to get what he wants by childish displays of emotion, such as whining, crying, tantrums and the like, these modes of expression will continue far beyond the time when they should be left behind. Yet violent rebuffs, unfair treatment, and other further frustrations may develop even less desirable behavior. Hence the necessity of creating situations in the school which call forth desirable modes of response.

It can be stated as a general principle that school procedures that arouse antagonistic or defeatist emotions in pupils and so interfere with their doing the best work of which they are capable are undesirable, and can be largely avoided by equating the tasks with the capacities, and respecting the legitimate desires and needs of pupils. Extreme cases need special investigation to determine, if possible, where the causes lie, that readjustments of the environment or a revision of objectives may be made.

In any case the teacher's attitude must be objective and impersonal. Teachers who themselves are emotionally immature sometimes take pupils' emotional outbursts personally, viewing them perhaps as a challenge to their authority or as a blow at their prestige, even returning the dislike and seeking petty, spiteful revenge. Pupils can be exasperating and hateful at times, but a show of emotion by a teacher is apt to weaken his position even though the pupils are afraid of him. If certain pupils dislike him, he can discover the reason and try to correct it, or be open-minded about permitting or arranging for the transfer of the pupil to another class or room if this is possible.

The task of aiding in the emotional adjustment of pupils to their social environment has come to be recognized as one of the chief functions of the school. The relation of the problems involved to the learning process, to esthetic appreciation and expression, and to the building of life values and ideals is discussed in later chapters. Here the nature of emotional responses has been indicated as a part of the process of attaining or failing to attain satisfaction of need. But there are other responses

to frustration that result in adjustments of one sort or another, some of which are quite satisfactory, while others are undesirable and need to be avoided or corrected when they do appear.

In Summary

The school, for the most part, has either neglected or ostracized the emotions. But, even if they have not been allowed to come in at the front door, some of them have ways of getting in, and the ones that do are likely to be the less desirable ones. The time has come for all schools to face the problem frankly and scrutinize their curricula and methods from the angle of satisfactions vs. conflict and frustration.

Emotions are actual responses to actual situations and involve observable bodily changes operating chiefly through the autonomic nervous system and the endocrine glands. To the extent that they are a part of the mobilization of the body for a physical emergency, they are out of place when the culture calls for less active participation, as in a class, a conference, or a committee meeting.

To be socially effective, the teacher has to learn to view situations in such a way that the overt expression of emotion is reduced, and he also has to learn to read the signs of emotion in children and young people, and to speak and act in such a way that they will learn to respond rationally when rational behavior is called for.

Analysis shows that there are three different stages of an experience, where three different kinds of emotion may be looked for: when a barrier to goal-seeking activity is in prospect, when it is present, and when it is viewed in retrospect. In these three stages, children, and adults as well, are likely to need help.

As people grow older, they occasionally retain or regress to the quickly aroused and explosive emotionality of childhood; but, as they mature, they tend to develop what the school can begin to help them in, namely, making appropriate emotional responses. But people are different in mood and temperament and in the sentiments they are capable of feeling. And therefore different kinds of experiences must be provided, and different kinds of responses to them can be expected. If a school actually takes these matters into account in its program, it will be a happy school, and its other and more specific objectives are more likely to be attained.

Questions

1. Give illustrations from your own experience of some of the different kinds of frustrations illustrated by the diagram in Figure 8. How did you meet them?

2. Suggest emotions that are omitted from the discussion in the text. Can they be classified in the categories here given?
3. What differences should the concept of emotion as "diffuse physiological response" make in the treatment of children's emotional outbursts by the teacher? of the emotional states of colleagues? of one's self?
4. Recall recent emotional experiences of your own, or those of some one else. Are they interpretable on the basis of the frustration principle?
5. Under what circumstances does frustration furnish happiness? What are the implications of this for the schoolroom?
6. What part does emotion play in biological adjustment? mental adjustment? Are the emotions useful?
7. Show how unfortunate emotional attitudes are sometimes inculcated in high-school classes, e.g., in literature, mathematics. Illustrate from your own experience.
8. Illustrate emotionally positive and negative situations in school which are under the control of the teacher.
9. Discuss the value to the school of interscholastic contests.
10. Is there a difference between "handling a person with kid gloves" and a good professional attitude in dealing with an emotional situation? Discuss.
11. Describe what teachers or administrators might say or do if they: (*a*) "ride roughshod over everybody," (*b*) try to please everybody. Describe some intermediate stages.

Readings

There are several excellent volumes on the affective states and emotions from which chapters may be selected.

Beebe-Center, J. G. *The Psychology of Pleasantness and Unpleasantness.* New York: Van Nostrand, 1932.

Gardiner, H. N., R. C. Metcalf, and J. G. Beebe-Center. *Feeling and Emotion: A History of Theories.* New York: American Book, 1937.

Lund, F. H. *Emotions of Men.* New York: McGraw-Hill, 1930. Also, *Emotions, Their Psychological, Physiological, and Educative Implications.* New York: Ronald Press, 1939. (Rev. ed., 1942.)

Prescott, D. A. *Emotion and the Educative Process.* Washington, D. C.: American Council on Education, 1938.

Young, P. T. *Emotion in Man and Animal: Its Nature and Relation to Attitude and Motive.* New York: Wiley, 1943.

The following references are to various aspects of the problem.

Cannon, W. B. *Bodily Changes in Pain, Hunger, Fear and Rage.* (rev.

ed.) New York: Appleton, 1929. Also, *The Wisdom of the Body*. New York: Norton, 1939.

The former elaborates the emergency theory, and the latter the concept of homeostasis.

Crile, G. W. *Intelligence, Power, and Personality*. New York: McGraw-Hill, 1941.

A theory of the sustaining action of the brain, heart, and thyroid system and the vigorous impulsive action of the adrenal-sympathetic system derived from the study of the organic structure of many animals made on numerous hunting expeditions in various parts of the world.

Dunbar, H. F. *Emotions and Bodily Changes*. New York: Columbia University, 1935.

A good exposition of organic conditions in emotion.

Garrett, H. E. *Great Experiments in Psychology*. (Rev. ed.) New York: Century, 1941.

Chapter X describes various experiments in the field of emotion.

Hoskins, R. G. *Endocrinology: The Glands and Their Functions*. New York: Norton, 1941.

A detailed descriptive account, written for the intelligent layman, and with proper scientific caution and discrimination between what is known and what is surmised.

James, W. *The Principles of Psychology*. New York: Holt, 1890. Also, *Psychology, Briefer Course*. New York: Holt, 1892.

Volume II, Chapter XXV, in the former and Chapter XXIV in the latter give James's own statement of his theory and should be read by those who have not already done so.

Luria, A. R. *The Nature of Human Conflicts*. New York: Liveright, 1932.

Treats emotion on the basis of researches on the disorganization of human behavior.

Paulhan, F. *The Laws of Feeling*. (1887 ed., trans. by C. K. Ogden.) New York: Harcourt, 1930.

The original systematic presentation of the view of affect, including emotion, as a consequence of frustration or the "arrest of tendencies."

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology*. New York: Harper, 1937.

An experiment on the emotional stability of teachers and pupils is reported on pp. 93–96, and the educational development of a child who feared teachers, on pp. 101–107.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.

Brief supplementary material on the ductless glands, pp. 49–55, and

good excerpts from Jersild, Darwin, Watson, Sherman, Bridges, Good-enough, and others, pp. 178–207.

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.
Short descriptions of the more psychologically important endocrines and their functions, with illustrations, from Cannon, Hoskins, and others on pp. 330–340, a psychological discussion of emotion by Warren and Carmichael, pp. 499–503, and a critical examination of the James-Lange theory by Cannon, pp. 511–517.

Frustration and Adjustment

Consequences of Frustration. The emotional response which may be expected to follow frustration is indicative of the inadequacy of an individual's adjustment to a situation, and as a rule it is nonadaptive. The exceptions are to be found in the milder or more pleasant emotions, in the increased energy output in an emergency, and in the extent to which an individual may get his way by causing those about to hover or cringe at any emotional display. In most cases, the task of adjusting still remains as long as the need and the desire last and the obstacle continues to block the way to their attainment.

Adjustments may be mental or overt. A mental adjustment is one an individual makes when he puts up with the situation, which he leaves unchanged; in making an overt adjustment he does something about it. Of course, the overt adjustment responses vary widely in their effectiveness. For example, if one were caught in a heavy rain, under differing circumstances, one might turn up his collar, don a raincoat, put up an umbrella, stand under a tree, or enter a building. Similarly, a boy or girl faced with an examination on the morrow might spend the evening at a dance, at the movies, or in study. However, until adequate overt adjustment is made, until the goal is attained and the need satisfied, mental adjustment may be expected. And if adequate overt adjustment eventually becomes impossible, if, like a downpour of rain in a treeless waste, or an examination the morning after a party, misfortune comes on unswervingly, some sort of mental adjustment is necessary.

A mental or an overt adjustment is made when a person finds barriers across the path of his desire, whether they are insurmountable or only seem so. Three possibilities are open to him: he may try to *escape* from the field, either in actuality or by subterfuge; he may try to *compensate* for his weakness; or he may *meet the frustration* more or less successfully by following the vectors that point to the task or by removing the barrier and attaining the objective.

The ability to recognize the various forms of adjustment varies with different individuals. But the teacher as case worker has a professional responsibility for recognizing them and dealing with them. Less satisfactory mental adjustments can no longer be overlooked in school practice or treated merely as cases calling for disciplinary action. More important still, teachers should not be guilty of employing them themselves.

1. ESCAPE

Avoidance. There are many ways of escape from frustration and its consequences, some wise and some not so wise. Children may run to the parent or teacher or, like adults, employ other means of avoidance or evasion. The most direct method of escape from frustration is to run away, to *withdraw* from the field. This is, of course, the only sensible procedure when one is quite unable to cope with threatening danger, and when to stand one's ground would mean injury or death. Fires, falling buildings, wild animals at large, and armed attack would be among the more obvious situations calling for actual escape for those not prepared to deal with them. But individuals sometimes run away from other kinds of situations—from tests of strength or skill in which they fear they may be worsted, which is called cowardice, and from confinement where their desires and needs are frustrated by the conditions of their existence. Prisons, jails, schools, and homes fall in this category. Different as these institutions are in many respects, they are alike in that barriers are set up in the form of walls and of regulations that frustrate at least some of the needs and desires of those inside. It has been found that the large proportion of boys who run away from home do so not in quest of adventure but because of severe punishments they have received or have been promised at home or at school. Truancy presents a serious problem even when there are but few cases of it, for it reveals that the pupils concerned are not finding the opportunities which the school aims to provide. Such needs as those for security, in the case of younger children, and for accomplishment and recognition are probably not being satisfied. Instead of punishing the truant, which is a process of intensifying the causative factor, a school might better re-examine its own program to discover how it can better meet the needs of the pupils who have sought escape from it.

Sometimes it is possible to *temporize,* to sit tight and wait until things blow over. Some forms of this have been called "stalling," or "dragging your feet," a familiar procedure in autocratic organizations where one cannot wisely disobey or overtly break rules, but can keep from getting into trouble by not doing anything—not "sticking your neck out."

Whether or not it is effective depends on circumstances, the efficiency of the organization, the perseverance and determination of the teacher, principal, or other superior officer, the importance of the situation, and many others. It is a form of negativism and, like it, appears when the individual is somewhat helpless in the midst of a social structure, does not wish to run away, or resign, and does not have the ability or power, or perhaps even the desire, to offer overt opposition.

In the most emotional situations it is probably sensible to ride out the storm, waiting until the emotions have subsided before taking action, if by that time action is necessary. Teachers can well overlook many things in the ordinary routine of a school day, though not everything. A policy of letting things take care of themselves, or deciding that a pupil's behavior is just a stage he is in, may result in the neglect of symptoms that should receive attention. From the point of view of the pupils, the quiet and innocence of the whole room when some disturbance has aroused the attention of the teacher of the disciplinarian type is ample evidence that they likewise can employ the mechanism to their advantage.

When the pressure becomes focused on the individual, evasion is likely to take the form of *deceit*. Children will often seek to avoid blame and punishment by lying, a means that is not confined to the juvenile years. In fact, if the situation is sufficiently serious, as in a war, deception is not only condoned but is exalted to the level of an art. But it must be practiced only on the enemy—the out-group. In most schools, the adults are the out-group, and "anything goes if you can get away with it." The stronger the discipline, the more the deception, though different classes and cultures maintain different standards.

A number of studies have been made of deceit in school situations, the technique being to provide the same kinds of opportunities that the school normally supplies.[1] Deception scores were found to bear little or no relation to church or Sunday School attendance, or to the work of certain secular character-building agencies. There was, however, a definite relationship to socio-economic status, and to classroom morale. There was little or no cheating in some schoolrooms, and a great deal in equivalent rooms in charge of other teachers. Furthermore, deception seemed to be quite specific, which is in accord with common experience. While some children would cheat under many more circumstances than others, as a rule they would cheat in some situations but not in others. Hence it would be unjust to designate some children as honest and others as dishonest.

[1] Hugh Hartshorne and Mark A. May, *Studies in Deceit*, New York: Macmillan, 1928. These results are further discussed in Chapter XVII.

Lying, like other undesirable behavior tendencies, seems to depend in part on the culture from which the pupil comes, in part on the success he has had in obtaining his objectives in this manner, and to a large degree upon the kind of pressures to which he is subjected. Thus children with intellectual abilities below the average of the group in which they are required to compete are often forced to employ various forms of deception in order to escape the disgrace of low marks and perhaps of failure of promotion. Against such realities, moral precepts are of little value. Confronting the pupil with the evidence of his deceit may or may not bring about a confession, but it is not likely to offer a solution to the problem.

Irrationality. Another kind of escape is through what has been called *rationalization*. To rationalize, in one sense of the term, means to define the logical relationships of a proposition, to find the reasons for a condition of affairs in harmony with accepted knowledge. But, as used psychologically, it refers to an irrational or illogical mental process used to make conduct appear reasonable. It is a process of making unreason seem rational, a kind of self-deception by means of which the individual strives to maintain his own feeling of self-satisfaction or superiority in the face of contrary evidence, and so continue to feel himself basking in the warmth of the social recognition which is one of his great needs. Rationalization may take the form of explaining away one's failures and finding plausible excuses for one's actions, to the neglect of the real reasons. It would be out-and-out lying if the individual were not able to convince himself by his own plausibility. A man excuses his extravagance on the ground of generosity to his family or friends; his poverty he ascribes to his honesty rather than to his laziness or prodigality; and he calls his miserliness thrift and frugality, his sharp practices and self-aggrandizement rugged individualism. Some forms of rationalization recur so regularly and are so clearly identifiable that they are easily recognized. They may be classified as devaluation, projection, and segregation.

Devaluation is a process of belittling the goal one has been unsuccessful in attaining, or, in another form, rejoicing in the failure of one's efforts. The first form is that made famous by the fable of "The Fox and the Grapes." The fox, when he found that the grapes he desired were beyond his reach, decided that they were sour. Similarly, it is usually the failure who contends that high rank in school shows narrowness of mind, and that the Phi Beta Kappa key marks the pedant; that an athletic letter is a sign of a misspent youth, or that commercial success is deplorable babbittry; that the artist is a sissy, and that the industrial

magnate is a profiteer. It was a child who was failing in the seventh grade who let it be known that his brother, who had dropped out of the eighth, was getting more money than the teacher. When a person belittles a thing, it is usually something he cannot attain. This practice is hardly necessary to human happiness.

The other form of devaluation occurs when the individual belittles his failure, even seeking to make it look as if he were better off for having failed. It is as if the fox instead of saying that the grapes were sour had said: "Yes, those are luscious-looking grapes, and I should certainly enjoy munching them; but, they might give me appendicitis." It is the response of Pollyanna, who, when her new hat blew off into the river, was glad it happened because someone might find it that needed it more than she did; or who, when it rained and spoiled the picnic, was pleased because she could read aloud to her dear Auntie who had been bed-ridden these many years! It is the conclusion that the outcome of failure is for the best. In the face of life's harshest blows, a person may perhaps advantageously seek any consolation, wherever it may be found. But such a spineless outlook, if generally accepted as a philosophy of life, would undo in a generation all the progress mankind has made in centuries of struggle. Its immorality is readily appreciated when it is contrasted with the heroic successes of science in the conquest of disease, which assuredly have not come by supinely accepting misfortune and failure and proclaiming that such things are for the best.

There is an amusing fable of a fox who inadvertently lost his tail in a trap. His efforts to convince his smiling comrades that he felt less encumbered and looked better without it were quite unconvincing—even to himself. He may perhaps be pardoned, since it was too late to do anything about it. But the child who is called in from play perhaps as a punishment and exclaims that he wanted to come in anyway; the girl who is quite satisfied not to be at the dance because she wouldn't know anybody there or hasn't a party dress she likes; the boy who tries to "kid himself" into thinking he is safer not playing in the game; the college failure who tries to recall the names of great men who weren't graduated; the employee who failed of promotion and decides that he therefore won't have to work so hard—as well as the woman who, when a storm held her train snowbound, decided that it "wasn't meant that" she should get home that night—all of these have a right to make the best of a bad bargain, provided they realize that that is what they are doing.

Another common rationalization by means of which people often delude themselves into a feeling of smug satisfaction is called *projection.*

What may be called guilt projection refers to a tendency to accuse others of having one's own temptations, weaknesses, and shortcomings. Thus a child may project his own dishonesty or cruelty on others and so gain satisfaction from the belief that they are perhaps more guilty than he. Or he may even go so far as to accuse them and see that they are punished. Failure projection refers to the tendency of an individual to blame some external conditions for his failures, thus projecting the cause of his frustration elsewhere instead of accepting it himself. A child may kick the chair he has bumped into, while the emotionally immature adult hurls a volley of profanity at it. A schoolboy may say that he got a low mark on an examination because he lost his book, or the questions weren't fair, or the examination was too long, or the teacher had a grudge against him, or hadn't made the assignment clear, or didn't mark the papers carefully, or didn't take up in class the subject upon which he was examined. One youngster, when his teacher pointed out the inferior quality of his work, with a look of injured innocence replied, "Haven't you ever heard of heredity and environment!" Failure projection is throwing the blame elsewhere for one's mistakes, instead of candidly placing it where it belongs. The poor workman's tools, the awkward ballplayer's glove, a rival's "pull," all come in for their share of the responsibility, as do the younger generation and the spirit of the age.

Sometimes failure projection becomes a social phenomenon, when it is called scapegoating.[2] Just as the Children of Israel in olden times symbolically transferred their sins to a harmless goat, so nowadays people, looking around for the cause of the misfortunes for which they are at least in part responsible, may ascribe them to "the government," to some political party, or to a minority group. When the mechanism is aided and abetted by those who can profit from it, and strengthened by the force of propaganda, it becomes positively diabolical in its consequences.

From these illustrations the process of projection is seen to be one in which certain characteristics of the self become in a way objectified and attached to outside persons or objects. This process may be observed in situations in which other characteristics than failure or guilt are projected. For example, when one sees objects or pictures in shifting cloud forms, or in the flames, or in ink-blots, he sees not what is there but what these amorphous "unstructured" forms suggest to him. Different people see different pictures. What each one sees is what he himself projects from his own mental life. In fact, the way that one interprets a play, a

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[2] *The A B C's of Scapegoating.* Foreword by Gordon Allport. Chicago: Central Y.M.C.A. College, 1945.

book, or a piece of music, or the way he criticizes a person, or institution, or even a house, a room, or any experience, depends on his own nature and outlook, what he brings to the experience. Thus interpretations or criticisms often reveal more of the interpreter or critic than they do of what is described.

On this assumption, so-called *projective techniques* of personality study have been developed,[3] among which the best known is the Rorschach test. This consists of a standard set of ink-blots which are presented to a subject who is asked to tell what they look like. The Thematic Apperception Test employs pictures of people doing various things which the subject is asked to describe. The replies serve as a basis for interpreting the personality of the subject.

A third irrational process is *segregation*, or compartmentalization. This is a more elusive kind of reaction to frustration, in that failures or dangers are not excused; they are merely disregarded. A person may figuratively do what the ostrich was once supposed to do, bury his head in the sand, refusing to admit the existence of the situation confronting him. The child employs this ostrich mechanism when he tries to forget about examinations on the morrow, lest they interfere with his good time. People who are enjoying themselves without thought of the cost are inclined to view as a spoil-sport one who suggests possible consequences which they are too willing to disregard, forgetting the old adage: "If you dance, you must pay the fiddler." The devoted parent visiting the principal's office exclaims, "Whatever my son is, he is *not* dishonest!"—when perhaps he is the worst little "shyster" in school. A certain complacency often operates to lead one to overlook facts which might shatter it. Two years after the first historic flight of the Wright brothers in a heavier-than-air machine, a popular scientific journal published articles about devices which might be used if man could fly.

People are notoriously blind to their own shortcomings, as they are to those of their children, their political party, or church denomination, their city, or country. When a fair-minded view of the facts might make for a much more realistic adjustment to the complicated factors involved, they look at their problems with blind eyes, or refuse to recognize what is before them, like the countryman before the circus giraffe, who exclaimed, "There ain't no such animal."

Another variation of this human penchant for compartmentalized

[3] See Ruth Bochner and Florence Halpern, *The Clinical Application of the Rorschach Test*, New York: Grune and Stratton, 1942; and Henry A. Murray, *Thematic Apperception Test Manual*, Cambridge: Harvard University Press, 1943. In L. F. Shaffer, *The Psychology of Adjustment*, Boston: Houghton Mifflin, 1936, pp. 302–303, is a brief explanation of the principle of the Rorschach test.

thinking might be called the bulkhead mechanism. Just as snug walls divide the interior of a ship transversely into water-tight compartments, that it may be kept afloat if it is struck, so strong psychic walls often separate the human mind into compartments which are logic-tight. The temptation to divide the mind in this way comes very strongly to the college student who, to retain his religious faith in childhood terms, keeps it quite separate from the wider interpretations of scientific and critical scholarship. Many a man can act as if he believes in universal brotherhood and class war, in the helping hand and profiteering, in religious liberty and inquisition, in free trade and a high tariff, or in world order and isolationism. And he may be quite unconscious of these ill-assorted tenets of his, though an outsider might think him a hypocrite or a fool.

The various forms of mental adjustment that are classified as rationalization—devaluation, projection, and segregation—are practices in self-deception that in their milder forms are probably more amusing to those who are aware of them than they are harmful to those who employ them. In their more conventionalized forms they become recognized techniques for "saving face," a term which in the Orient applies to a large number of well-established social usages. They serve to bolster one's self-esteem, which in this competitive society is sometimes sadly in need of bolstering, and, if recognized as such and not overdone, may serve a useful purpose. However, their essential falsity as an approach to one's problems would seem to make them far less desirable than a clear recognition and acceptance of one's mistakes and weaknesses.

Fantasy. A striking and sometimes dangerous way of escaping from the barriers of frustration is to be found in fantasy. This has also been called autistic thinking and, more commonly, daydreaming. The child who fails in his school work may imagine himself receiving a prize for scholarship; the indifferent sixth-grade baseball player, hiding behind his geography book, may be receiving an offer from one of the big leagues. The Cinderella theme, going back as it does into the remotest antiquity, is the daydream of the drudge who becomes a princess, and finds a modern parallel in the success stories of newsboys who become millionaires, or stenographers who become movie stars—stories eagerly devoured by the mediocre.

The case is reported of one child who was unhappy at home, who used to enjoy walking in the garden, where she daydreamed that the flowers, swayed by the summer breeze, were doing her obeisance. One charming girl, who had had a sinister cast to her dreaming, reported of her child-

hood, harried and tormented as it was by older brothers and young uncles, that she used to imagine a great battlefield where they had all been killed or sorely wounded. After the battle, she would walk along and see a gory brother or uncle lift supplicating hands to her; but she would summarily kick him back into the ditch. That this girl was still happy and well adjusted at the age of twenty-three is one bit of evidence that the most surprising fantasies may be without serious harm, though it is probable that she is differently constituted nervously from what she would have been had she not been subjected to the bullying of those unthinking brutes.

The daydreams cited illustrate a characteristic common to them all —namely, that the dreamer always plays a part in them, and an important one, too. He attracts to himself in his imagination the attention and regard of others which he misses in his ordinary environment, and which is one of his greatest needs. He is, then, a prince, a king, a warrior, an aviator, or some other *conquering* hero. Or else he is a *suffering* hero, in dire misery, perhaps on the point of death, or even already dead, so that he can picture to himself the concern of those about him which in actuality is far less than he feels it should be. These states of mind offer interesting parallels with the delusions of grandeur and delusions of persecution so common in the psychopathic hospitals, except that in these latter cases the delusional systems have lost their contact with reality; the dissociation is complete.

The chief danger of fantasy lies in the possibility that it may be substituted for overt response, so that a person gradually forms the habit of gaining his satisfactions in this way. The child who imagines his victories is all too apt not to work for them. And, as he grows older, he may seek the help of alcohol and drugs to give more vividness and color to his beautiful dreams.

The poet, of imagination all compact, builds his dreams for others, as do all artists, laboring long with reluctant words or notes, oils or marble, so that a beauty they alone perceive is brought home to common men. It is easy to see why the artist, whatever his materials, might find himself at odds with his fellows who are made of commoner clay; why prophets, keen in their analysis of social values, have in all ages not only seen that the times were out of joint, but have set about the task of setting them right; and why others, less persevering, have written their utopias— worlds refashioned more nearly to their hearts' desire. Fantasy, then, is an escape from the pressing realities of life and, like a vacation, is probably not only a delight but a necessity. But neither the useful nor the happy life is a perpetual holiday. Difficulties must be overcome; and

dreams may furnish respites from toil, or they may themselves, as works of the constructive imagination, be hammered into actual deeds and real achievement.

Individuals who are more prone to find satisfaction in the inner world of their own imaginings have been termed *introverts* by C. G. Jung, the Zurich psychoanalyst. Conversely, those who are happiest in the give-and-take of social activity, in play with others, or the comradeship of club or lodge, have been called *extroverts*. The terms are widely used but vaguely defined, and often incorrectly understood. Besides these two main groups, Jung further classified people into four subtypes—the sensation type, who are guided by simple perception of concrete reality; the thinking type, who are influenced by what they think, and must comprehend to adapt; the feeling type, who are guided by what is pleasant and unpleasant; and the intuitive type, who are prone to play hunches or follow inspiration. A person may be consciously an introvert in one of these respects, which constitutes his dominant type, and unconsciously an extrovert in others. These finer elaborations have not received the attention that has been given the two main groups. Instead, the term ambivert has been coined to apply to the majority of people, who are not predominantly introvertive or extrovertive.

Jung described the extrovert as one who gives his interest to the outer objective world and attributes an all-important and essential value to it; while the introvert considers the world according to the effect it has upon him. Thus, the extrovert in his decisions is actuated by external factors, by what people will say, and is quick to adapt to his environment, with an accompanying tendency to make social contacts; while the introvert is actuated by inner or subjective factors, is reflective, and may be thoughtful, and shy, with a tendency to withdraw from social contacts.

It is perhaps this latter tendency which has led some wrongly to suppose that introvertive characteristics are dangerous to mental health. There has been a commendable educational emphasis upon the desirability of socialization in recent years and attention has been directed to the "shut-in" or seclusive child, who does not participate in group activities. Psychiatrists have pointed out that case studies of *schizophrenia* or *dementia precox* usually reveal a history of this sort. The inner life of fantasy becomes more attractive than the outer world of reality, so that these cases withdraw more and more into themselves and participate less and less in the world of outside reality, which would interfere with their inner enjoyment. Schizophrenics develop delusions, or unfounded beliefs, often that people are persecuting them. Hallucinations appear in which they see visions and hear voices which speak their own desires,

and which may lead them viciously to attack quite harmless individuals who, in their morbid imaginings, they may believe are seeking to do them harm.

But schizophrenia is a mental disease, a psychosis, a far cry from normal fantasies which have delighted mankind from childhood on, through which escape has been sought from the mundane realities of life. True, the markedly introvertive or seclusive child will probably be happier if he can learn to participate normally in the expected social activities, but this is as far as the school's responsibility can be said to go. The natural responses of the introvertive child may be antisocial in an underhanded, sneaky way, or they may be social, making him a very acceptable member of the group because of his friendly jokes, his writing, or his quiet leadership. Similarly, the overt behavior of the extrovertive child may be antisocial—noisy, destructive, and disruptive, or it may be helpful, cooperative, and sympathetic, exerting a blustering, friendly leadership. Thus the extrovertive as well as the introvertive child may have his difficulties in adjustment; but each has his own kind of contribution to make to the social group, and his own ways of finding satisfaction and enjoyment in life.

In his fantasies, the child is playing a part in an imaginary drama. This part may be one that he has made up for himself, or it may be the rôle of some prestige person, parent or teacher, or athletic hero, or gang leader. Sometimes the child even affects the dress or appropriates the mannerisms of another. This process of imaginatively becoming someone else is called *identification*. It differs from projection since in the latter the self gives the other person or thing its own characteristics (guilt, failure, etc.), while in the identification process the characteristics of the other person are appropriated by the self. At a play or motion picture the people in the audience experience the sufferings and the triumphs of the characters, who are so depicted that the process is not difficult and it is usually quite enjoyable, since the manly men and beautiful women give substance to the fantasy rôles people like to create for themselves. Such emotional identification is sometimes called *empathy*.

But the imaginative identification of oneself with another is not confined to such brief emotional experiences. It involves a taking-over of the attitudes and prejudices, the ways of thinking and behaving, and the kinds of choices that are made. The process may be easy to observe, and in its extreme dissociated form becomes the delusion of the paranoiac who thinks he is Napoleon or some other conquering hero. On the other hand, it may be quite subtle, and difficult to detect, and quite separate from any daydream experience. The individual may repeat opinions he

has heard expressed by someone he respects, or seek to influence or direct others in the way that he has been influenced and directed. In this way, the very personalities of the older generation may be said to live in the lives of those who come after them.

The effectiveness of identification can well give a teacher pause. On the negative side, he may lose the opportunity to influence young people by failing to live up to their prestige demands. His actions may speak so loud that no one can hear what he says. On the other hand, if he is accepted as a prestige person, he may be sure that his influence will operate in the lives of his pupils long after he has forgotten their names and faces.

Repression. A fourth form of escape is found in repression, as expounded by the late Sigmund Freud, of Vienna, the founder of psychoanalysis. According to this doctrine, many things are forgotten not because the impression fades but because they are actually "put out of mind" owing to their unpleasant associations. But it is contended that such memories are not actually lost, as evidenced by their recurrence in dreams and in hypnosis. Instead, according to the Freudians, they are repressed and continue in the unconscious. The same thing is claimed concerning the loss of articles which, because they are associated with unpleasant experiences or disliked persons, are purposely, though unconsciously, mislaid, even though the person may consciously regret their loss. The basic principle which Freud has laid down concerning what he termed the "psychology of error" is that all psychic (that is, mental) events have meaning and purpose. Hence even slips of the tongue and pen indicate the repression of an existing tendency to say something not in harmony with what the individual intended to say. In general, then, errors occur through the conflict of two different intentions, one of which, the unpleasant frustrated one, has undergone repression. This doctrine is not universally accepted as an explanation of all such errors since some of the conflicting intentions are not at all unconscious, and since there are probably other more or less inhibitory conditions operating which are not traceable to emotional or conflict situations.

A more extreme form of repression, the Freudians contend, is responsible for various neurotic conditions or *psychoneuroses*. While many of these are not easily classifiable, three forms are commonly distinguished: neurasthenia, psychasthenia, and hysteria. The most common of these is *neurasthenia*, usually called a "nervous breakdown." The symptoms are fatigue, headache, loss of appetite, digestive disorders, insomnia, irritability, anxiety, depression, and feelings of inferiority,

though the occasion for the latter, the obstacles or difficulties to which he has failed to adjust, may not be clearly recognized by the patient.

A more serious form, in which there is a more obvious splitting of the personality, is called *psychasthenia*. This is accompanied by various symptoms, many of which are found in other types of mental disorder. There are the phobias or intense irrational but uncontrollable fears of such things as high places, blood, contamination, crowds, poisoning, and so forth. There are obsessions, or more or less emotionally toned irrational beliefs, such as that of one patient who wept continually because she caused the World War. There are the compulsions, a similar phenomenon except that the patient endlessly repeats some simple act, like washing the hands, a condition which can perhaps be partially understood by recalling the troubles of Lady Macbeth. There are the tics, or simple automatic acts, such as twitching of the face or smacking the lips, and the various seemingly absurd doubts and scruples which distress the individual out of all proportion to their importance and are often accompanied by a feeling of unreality, strangeness, and general inadequacy.

When the personality is still further dissociated, the affliction is known as *hysteria*. In its more extreme manifestations it may take the form of the double or alternating personality, or of somnambulisms, reports of which sometimes find their way into the newspapers, as when a man is found miles from his home and has quite forgotten who he is or whence he came. Such loss of memory is known as amnesia and may extend over a period of many weeks. More common symptoms are the anesthesias in which parts of the body are quite insensitive to pain, and the paralyses, both of which are genuine symptoms, but apparently have no neural or muscular cause. Cataleptic "fits," and probably all so-called genuine psychic phenomena often connected with trance states, are classified as hysterias.

The psychoneuroses are usually considered to be functional disorders, meaning that the dislocation is in the operation of the neuromuscular mechanism, not in its structure. They seem to be a form of escape from conflict situations which individuals are powerless to resolve. They are thus to be distinguished from the *psychoses*, or mental diseases, which are much more serious, usually necessitating institutionalization, and which, in some cases at least, are caused by some structural dislocation. The chief psychoses are schizophrenia and manic depression, which have been previously mentioned, also epilepsy, toxic psychoses due to focal infections as of the teeth or tonsils, and paresis, or general paralysis resulting from cortical destruction by the syphilis germ.

Since the case histories of some of these mental conditions reveal early stages of development, it would seem advisable for teachers to know about these symptoms and recognize them if they appear so that the environmental pressures can be relaxed and adequate psychiatric examinations given. Beginning symptoms may be summarized as follows:

Psychoneurosis. The commonest symptoms are an overconcern and anxiety about ordinary events, feelings of fatigue and tension, and fear of failure, disease, death, or approaching insanity.

Schizophrenia. The early personality traits are strongly introvertive showing an avoidance of competition, shrinking from realities of life, aloofness, reticence, and isolation. The individual exerts little energy, attention wanders, and daydreaming is habitual.

Manic-depressive psychosis. The early personality traits are strongly extrovertive, the individual impresses one as bright and energetic with a strong tendency for action. But he also shows strong up-and-down variations in mood and emotion, the reactions increasing in magnitude under stress.

Epilepsy. Periodical ill-humor is the most differentiating early trait, with the inability to meet emotional and physical strain. A later stage shows more or less obvious stages of mental confusion, the individual sometimes becoming delirious.

Toxic Psychosis. The symptoms include mental confusion, with dreamy fancies and an apprehensive, very restless state, accompanied by fever and in more advanced states by delirium, hallucinations, and delusions.

It should be emphasized that these are not the characteristics of the mental diseases named, but of those who later developed the diseases. People who have such symptoms are not necessarily "prepsychotic." However, they should not be treated as disciplinary cases, but instead they should be given expert psychological or psychiatric attention.

Freudian Psychology. Before concluding the discussion of repression it may be well to elaborate somewhat the basic tenets of the Freudian psychology which has had so much influence in the interpretation of normal as well as abnormal personalities, even though many of the techniques of treatment and the details of the doctrine are not universally accepted. The physician who specializes in mental cases, who ministers to the mind diseased, is called a psychiatrist or alienist. He may or may

not be a Freudian, or he may reject some of the psychoanalytic doctrine and accept other parts of it. Indeed, Freud himself changed quite noticeably with the years. In his earlier practice he sought the cause of these afflictions in some early emotional shock or *trauma*, some blasted love, some childhood terror; and the psychoanalytic technique was worked out simply to get back to these experiences. The patient, sitting or reclining at ease, is allowed (or urged) to tell of anything and everything that comes into his mind. This is called the method of *free association*, the analyst allowing one thought or recollection to follow another as it will, sometimes asking, "What does this make you think of?"

He also asks the patient to recall his dreams, for it is in his dream life that the individual reveals the nature of his desires—the child clearly, in their unmutilated form, the adult in a strangely twisted and distorted condition which makes interpretation necessary. The reason for this mutilation or *dream work* is that the adult, having become sophisticated, and hence trammeled with taboos, will not admit some of his repressed desires even to himself in his dreams until they are made over, or *censored*. The psychoanalyst, therefore, has assumed the task of interpreting dreams to discover what the person's repressed desires really are, thus overcoming the work of the censor.

The principles of dream interpretation seem somewhat bizarre to one who is not a whole-hearted psychoanalyst. For example, parts of the dream the patient cannot recall must be supplied by the analyst. They form the *latent content*, in contrast to the *manifest content*, which the patient can remember. Emphasis, in the form of the duration or emotional vividness of the dream events, is displaced, so that the seemingly minor things may really be most important. A dream often needs to be interpreted as its opposite, as hate for love, and vice versa. And many common objects are regarded as symbolizing something usually related to the male or female sex life. Occasionally, the patient passes hurriedly over some point and refuses to tell about it. It is then that the psychoanalyst's art is needed tactfully to break down the patient's resistance. For where there is a *resistance*, there is some group of emotionally toned ideas and associations called a *complex*, which may be at the root of the difficulty. When the right complex is brought to light and analyzed, the symptoms were supposed to disappear, according to the earlier belief that analysis is cure. Or the patient might *sublimate* his desires by finding socially acceptable expression. Thus the desire for children might be sublimated by adopting, by teaching, or social work, for example. Sublimation is thus seen to be a form of substitution described in the next section.

Because Freud's patients sometimes returned with a recurrence of their former malady after they had supposedly been cured, it was necessary to push back still farther into their past until the period of infancy was reached, when recollections by free association methods failed. Psychoanalytic speculation, however, was equal to the emergency.

What Freud termed "the anatomy of the mental personality" in one of his latest books clarifies the conditions which he held determine the nature of the conflicts that take place within the individual (see Figure 9). The *ego* is in contact with the outside world through the activity of the perceptual conscious system. It is this system with which psychologists have been primarily concerned, its function being to unify, synthesize, and organize experience. It is governed by the so-called *reality principle*.

The *id* is the unconscious, dynamic aspect of personality. It is the connection between the neural and glandular processes respon-

Figure 9.   Freud's Anatomy of the Mental Personality.

sible for instinctive drives and their mental expression. Contradictory impulses exist side by side. It has no logic, no sense of space or time, no organization and no unified will, only an impulsion to obtain satisfaction according to the *pleasure principle*. Freud has posited certain instinctual drives that are predominant. These are self or hunger, and race or sex (libido), which Freud speculatively combined as self-preservation and preservation of the species under the name Eros, or life instinct, which works with and against the death instinct.

The *superego* performs the function of self-observation, rejection, and punishment, and holds up values and ideals. Conscience is one of its activities. It is the rôle first played by parental authority and taken over by the process of identification with the parent. The superego may, like the ego, be unconscious. Since the existence of unconscious mental processes is assumed from their effects, the individual is not directly aware of them at the time. The transfer to consciousness is difficult and

may never occur. The mental content of the preconscious, which corresponds to what has been called the "fringe" of consciousness, can, however, easily become conscious, particularly by psychoanalytical free association. Thus the ego is in a three-fold conflict situation: with the world of reality, with the driving energy of the id, and with the selection and rejection function of the superego.

In a criticism of Freud's system, its occasional improbabilities and the unscientific manner of its presentation, as well as the seemingly excessive emphasis upon sex, which has troubled the prudish, are beside the point. Psychoanalysis may be conveniently thought of as a body of doctrine, as a therapeutic technique, and as a point of view, and so may be intelligently criticized and evaluated on one or another of these grounds. As a body of doctrine, it probably has its share of errors, which can be corrected by later research, for its many bold hypotheses will unquestionably stimulate investigation for many years to come. Just how "unconscious" repressed desires are, is still a question, as is also the extent of harm that is ordinarily done by repressing them, which may be more than was commonly supposed, but less than the Freudians contend. As a technique for the cure of mental disease, psychoanalysis is largely independent of its doctrine. Or, stating the matter differently, cures by its technique, which have doubtless been brought about, do not establish the validity of the philosophical superstructure. For mental cures of functional or psychogenic disorders have been worked in all ages and on the basis of many a differing belief, although the mechanism of such cures is still obscure.

As a point of view, considering man as a whole—a dynamic, striving organism—it has directed attention to many neglected aspects of psychology. The mental hygiene movement has profited immeasurably from its influence, and indirectly the attitude of school people toward "disciplinary" cases has been definitely modified, so that the principle of retribution has been largely replaced by the clinical approach with respect to problems of human adjustment and maladjustment.

2. Compensation

Substitution. The responses to frustration which have been discussed thus far—avoidance, rationalization, fantasy, and repression—are all means of escape, some of which are far from satisfactory. Another type of response to frustration is to be found in compensation. When confronted with a complex situation that promises to thwart him, a person may substitute for the object of his desire some other object which will have

the effect of satisfying his needs. His immediate goal; the thing he wants, then changes, but the need remains the same. It is as if the fox had said: "I am hungry and those grapes look good. But I can't reach them; so I guess I'll go rob a henroost and get a meal that way instead." It is generally considered evidence of emotional immaturity when a person becomes angry or sulky if he cannot play the game he wants to play, or get just the dish he ordered, or the chair he is accustomed to, if other means are at hand of satisfying his need for exercise, food, or rest, as the case may be. Children and young people can be helped to see that there are other activities, clubs, schools, even other vocations, or possible life-mates than those they may have set their hearts on, to provide them with the satisfactions which they desire and need.

In many situations, therefore, it is sensible to find for oneself, or provide for others, some substitute objective that will satisfy the need and so attain the goal. However, there may be times when there is no satisfactory substitute, and to give up is merely cowardice. Those who continually search for the easiest way often find that they lose sight not only of their original objectives but of their goals as well. They hesitate to take a stand and are guided only by expediency. They may succeed in holding their jobs, and they may be applauded but they are not respected.

The Inferiority Complex. Alfred Adler, of Vienna, another psychoanalyst, though not a Freudian,
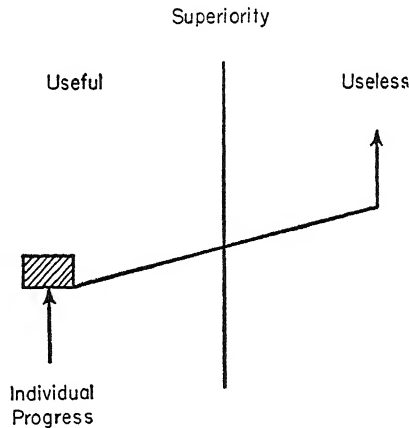
Figure 10. Adlerian Compensation

elaborated the possibilities of the response by substitution and gave it considerable publicity, calling it *compensation* for inferiority. He taught that everyone's goal is superiority, that many are handicapped in its attainment, and that they therefore develop a feeling of inferiority, or in more extreme cases an inferiority complex, which colors their every act, and which they endeavor to overcome by exhibiting superiority somehow, whether wisely or not. He employed such a diagram as is shown here in Figure 10. The individual strives toward his superiority goal but he is thwarted; and so he weakly evades the issue and seeks some other objective leading to his superiority goal, turning perhaps to the useless side, where false or antisocial pre-eminence may be achieved.

According to Adler, the people most likely to develop an inferiority complex are those who have some organic defect, particularly impotence or sterility; or they may be children who are crippled or deformed in some way. Similarly, the homely, ill-dressed, foreign born, and the backward and generally ill-favored are apt to be frustrated in their efforts to attain recognition or status (power) either in their own groups or with respect to the demands made upon them by the school. Pampered children may also develop a feeling of inferiority and compensate for it because they, too, are frustrated. They find that the imperious demands which have been successful with nursemaids and indulgent parents are not effective with schoolmates and teachers.

There are many ways of compensating for a feeling of inferiority. A child may build up a reputation for profanity or obscenity, or he may boastfully tell the most fantastic lies about his past life. He may start any kind of mischief to obtain the amused admiration of his mates and the special attention of the teacher and perhaps the principal. Or the case may take a more serious turn if the child becomes delinquent. The task of the school in this connection is to provide opportunities for compensation which are at least harmless, and at best socially desirable. So-called disciplinary cases often arise because a child has no chance to excel along legitimate lines. The wise teacher, then, will provide such outlets, whether they be scholastic or extracurricular, and furnish social recognition for excellence in them. It is far better for a child to blow a saxophone, play on some school or class team, collect stamps, or turn beautiful handsprings in the gymnasium, than to have him attempt to satisfy his need for recognition and regard in more harmful ways which he can be counted on to devise.

Cooperation. Opportunities for cooperative effort may serve to provide the occasion for compensation for an individual of lesser ability who can find satisfaction in being one of a group that accomplishes something even though his contribution is a minor one. A dramatic organization, for example, needs actors; but it also needs electricians, wardrobe managers, make-up experts, property men, and stage hands. Though the more lowly positions do not receive the acclaim which may be vouchsafed the stars, it can honestly be said that their work is not only important but necessary. Children and young people who can be brought into a group, and who can find a necessary rôle in its activities, are not so likely to be forced into undesirable forms of compensation. And at the same time they do not have to enter into the kind of competition in which they may not be successful. Responsible membership

in a group can usually provide an individual with a rôle to play that will give him status and recognition. It will, therefore, not always be necessary to find ways in which he can excel as an individual. If he obtains status in a cooperating group, he can the better withstand reverses in other activities.

3. MEETING FRUSTRATION

Resignation. Escape responses result in avoidance of the obstacle; compensation permits detours around it. A third possibility is to meet it directly in one of four ways: by accepting defeat with resignation, by opposing the obstacle aggressively, by using various forms of persuasion on those who are able to remove the obstacle, and, lastly, by solving the problem on a rational basis.

Many of the great philosophies of the past have weighed the advantages of one or another form of response to frustration. Oriental philosophy preaches the doctrine of the extinction of desire, a solution that is effective if it can be attained, but one not particularly acceptable to occidental peoples. Mohammedan and Christian doctrines hold out the prospect of a future life, the blessings of which outweigh the sorrows and reverses of the present. Various fatalistic beliefs accept the proposition that what will be will be, that death will come at its appointed time, and that, since nothing can be done about it, there is no need for concern.

The Stoic philosophers have taught that, if the nature of reality is understood, man will be able to accept what comes with equanimity. It is clear that such acceptance does not involve the necessity of any rationalization to devaluate the goals that are unattainable. Nor does it negate the importance of knowing what one can about the universe, that some control of events may be exerted. But rather it teaches the necessity of being resigned to failure and defeat if it has already occurred, or if it is unavoidable. If a game has been lost, if an examination has been failed, if one has been overpowered by a superior force, if death has taken away a friend in spite of all the efforts of medical science to combat it, the only sensible way to meet such situations is to accept what has happened and become reconciled. Such an attitude of resignation does not usually come naturally, and both children and adults often need help in acquiring it.

A good way to begin is to follow the moral of the fable of "The Hares and the Frogs." It seems that the hares decided that life was not worth while because they were afraid of and had to run from everything; so they all set out with a rush to drown themselves in the river. The frogs, meanwhile, who had been resting on the bank, when they saw and heard

the army of hares rushing down on them, took fright and jumped madly into the water. This action caused the hares to pause and reconsider, for they had discovered there were creatures who were more fearful even than they; so they all went back home more contented than they had been in many a long day.

This does not mean that a pharisaical or smug satisfaction at being better off than others is in any way commendable; nor does it mean, when one's difficulties may be overcome with the exercise of intelligent effort, that it is sensible to sit back and say that at least others are in a bad way too. What it does mean is that, in the face of conditions which do not yield to correction, the view that others likewise have their troubles, that one is not alone in his disappointments, that such, at least in part, is one's world, is often exceedingly helpful. Such conditions range all the way from the inevitableness of death and taxes, to the minor but nevertheless wearisome vexations of the daily routine, including a fair share of defeats, the annoyance of occasional sickness, and the seemingly greater successes of rivals. It is not a flight from reality, but a stoical recognition of the nature of reality.

Aggression. The opposite way of meeting frustration is by aggressive behavior, by fighting back against the prospect of defeat and its consequences. It has been averred by some that there is no aggression without previous frustration;[4] but this states the proposition a little too strongly, since some individuals show aggressive behavior when there has been no discoverable frustration of any significance. However, it may be safely contended that aggressive behavior on the part of pupils can well lead those in charge to look for frustrations in the case history.

The forms which aggressive behavior may take are numerous indeed. Most of them, for convenience, may be classified under one or another of the following heads: determination, compulsion, deception, rebellion, and retaliation. *Determination,* viewed as increased energy output to overcome the obstacle, is recognized as desirable providing the objectives and goals are acceptable. The term "will power" is widely used in this connection. Exhorters of youth are inclined to preach the doctrine of the strong will. If you are faced with a hard job, with difficult and even overwhelming odds, "grit your teeth," "buckle right in," "put your shoulder to the wheel," "dig in," they implore, using divers metaphors. Undoubtedly, this is often excellent advice. The boy who is "yellow," who slows up before hitting the line, and the girl who always dodges the

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[4] John Dollard and others, *Frustration and Aggression,* New Haven: Yale University Press, 1939.

hard work in quest of a good time, will grow into the man or woman who will need to develop considerable skill in rationalizing the failures that life is sure to bring.

Perhaps it is unwise to say anything that might weaken the force of this exhortation. Yet it is a pity that any one should foolishly go on butting his head against a stone wall just because he unwisely started in that direction, when there may be a stile or even a gate within easy reach. Grant actually did not fight it out along that line all summer; Napoleon turned back at Acre; and the famous Light Brigade, but for the pages of romantic verse, might better have followed their example. Admittedly, the fox chose an easier way when he decided to call the grapes sour; for he might have jumped for them again and again until he died of exhaustion, and been lauded in an impressive funeral oration for his perseverance. Or he might have been wiser and procured a ladder or hunted out a lower-hanging vine. It may make an appeal to the sentimentally minded when a child whose intelligence is well below the average flings himself again and again at the examinations in algebra and Latin, or when the conscientious, industrious, good-tempered, but stupid young man aspires to college. But there is some question whether it would not be wiser for them to decide, before they become exhausted and quite discouraged, that there are attainable goals toward which they can labor that will furnish the satisfaction of their desires and supply them with the fulfillment of their divers needs.

This is just what the present-day schools are endeavoring to do, with their evaluation programs, their educational and vocational guidance, their diversified curricula and pre-vocational work. The single track through the academic courses heading for college and the professions, while it may be well suited to the gifted few—and it is very important that these be well suited—hardly furnishes the most profitable kinds of experience for the millions who can travel only part of the distance before dropping out to fit somehow or other into the adult community.

A second form of aggression is *compulsion*, in which the person who is thwarted employs superior strength to overpower those who are responsible for his frustration. Between nations, the battlefield was once the "field of honor," but people are beginning to realize at long last that the paths of glory lead not only to the grave for many of the participants, but to the destruction of values which take years if not centuries to rebuild. "Affairs of honor," feuds, and border raids, in many parts of the world, are recognized as stupidities of the past, and those who would take part in them as criminal or insane, to be treated accordingly. One wonders how long it will take the people of the world who always bear

the brunt of international strife to treat those who foment it in their own country or any other in a similar fashion.

The use of force among children has long been deplored, and predatory gangs that but ape the ways of their elders are broken up and their members re-educated if possible. Quarrels and fights between individual children, as well as the behavior of the school "bully" who picks on smaller children, are recognized as evidence that the individuals concerned are maladjusted and have failed to learn acceptable ways of harmonizing their desires with those of others. They may be big boys and girls, but they are preschool children in this regard. The schools haven't done too much to help them learn the lessons of democratic cooperation.

Aggression may take more devious forms than direct attack. It may be displaced, as previously noted. *Displaced aggression* may be mistaken for the more direct form—as when a teacher might say to a child, "Tell me, Archibald, why did you hit Charlie? He is so much smaller than you are!" Poor Charlie may have just come along when Archibald wanted to hit the teacher! But he was wise enough not to try that. Displacement is likely to occur when the individual does not have the power or courage to attack directly.

A still less overt form of aggression is found in *defamation* of the character of an opponent, which may be used to weaken or destroy his influence. Merited or unmerited criticism may degenerate into "mud slinging" and name-calling, though more delicate knifing takes the form of the circulation of lies and of idle or malicious gossip. Such activities may be employed viciously as a means of weakening the position of an opponent or superior, or they may merely give evidence that the individual is compensating for his inferiority by employing the devaluation mechanism. Teachers will do well to remember this, for, whether they intend it or not, malicious gossip does weaken the position of colleagues, but it also weakens their own position, instead of building it up. The reason is twofold: they lay themselves open to the attack of those whose reputation they are defaming, and they tend to share the reputation of the others in the same school.

Another form of aggression is *deception*, which is like displaced aggression and defamation in that it is often the method of the weak. In the fables, the little animals in various ways outwit the strong. The common people in an autocratic state, like the pupils in an autocratic school, must live by their wits, and anything goes so long as one is not caught, and does not tell. Deception can be used, as already said, as a means of escape from difficulty, as when a child lies to avoid punishment. But it can, of course, also be used as an offensive technique to get what one wants.

And, unfortunately, it is a weapon which the clever and strong also can use to get what they want from the ignorant and weak. Perhaps the schools do not do enough to train children to identify the deception of others in order to keep them from becoming the dupes of the unscrupulous. To provide this training it should not be necessary to deceive them at regular intervals in order to teach them not to trust anybody. But, if fewer were gullible, fewer would be deceived, and the traffic in gold bricks would fall off.

As things now stand, an individual may be lied to or the situation misrepresented in such a way as to get action which would not have been possible if the facts in the case had been fairly presented. The financial difficulties of some commercial firms are met by an advertising campaign which represents the articles they have to sell in a more favorable light than the products may actually deserve. In the political sphere the device of misrepresentation is referred to as propaganda. In community disputes a teacher is in danger of being "taken in" by one or the other faction unless he makes a point of informing himself concerning the motives of those who endeavor to enlist his support.

Deception, however, is by no means restricted to the adult world. Even quite young children are apt to try out such schemes and use them if they work. One three-year-old learned to say "Mommee tol' me," so as to be allowed to do whatever she wanted. Once, when her mother, who had not told her she could do what she was up to, suddenly appeared on the scene, the child quickly changed her tune to, "Daddy tol' me." Cheating in school occurs in games, on examinations, on written work, and on objective tests. Individuals usually cheat to improve their standing; but when a poor mark will make it possible to avoid some added responsibilities or efforts, what is called *malingering*—that is, taking more time or making more mistakes than necessary—is sometimes practiced. Teachers can encourage cheating by attaching too much importance to written exercises and making the penalties for failure too severe. They can likewise encourage lying by setting the stage in such a way that children are virtually forced to lie. A more sympathetic and helpful attitude will usually bring a full confession and a willingness not only to make what restitution may be necessary, but also even to accept a fair punishment with the realization that deception is a less satisfactory method of meeting difficulties than others that can be used.

Another form of aggression, one which appears as an overt attack on those who have been too successful in exercising control by force, may be called *rebellion*. It may occur in individual cases after a long period of seeming acquiescence, when, as we say, "the worm turns." In such

cases teachers often wonder why a child who has always been so "good" should act that way. Or, at the other extreme, it may be a mass movement, like a strike, with speeches and banners, which usually indicates that there has been dirty work at the crossroads, and the school administration or perhaps the board of education needn't say much about character education for quite a while. The more common forms of rebellion, however, are those in which a pupil "talks back" or "refuses to do what I tell him to," or is "rude and disagreeable."

The usual school practice in the case of rebellious behavior is to tighten still more the disciplinary noose about the neck of the hapless rebel. It sometimes happens, no doubt, that if rebellion is punished the pupil may cast about for ways of meeting frustration that will be more successful. He may hit upon the plan of active social participation in the school program, or he may rebel more violently, harbor resentment, or seek ways of escape. Rebellion can well be viewed as an arrow pointing to red on the temperature gauge, a danger signal indicating that something is wrong—not necessarily with the pupil, but more probably with the school organization and management.

The hopeless form of aggression is *retaliation*. In its more severe forms it is called revenge, and reveals that the individual feels that he has been wronged, and nothing can be done about it except to make those responsible suffer. "I'll get even with her yet," we might hear the child mutter, and the result will not be all sweetness and light for pupil or teacher. Retaliation in the case of young children may be directly aggressive, except that there is no expectation of success.[5] It may look like displaced aggression, but a closer study reveals that it is not displaced. The table which is kicked will be one which the child has been told not to mar. He is definitely getting back at his parents. He'll show them! It is likely to be accompanied by outbursts of anger, or it may be more cold and calculating, particularly as children grow older, and grudges are cherished and the individual bides his time.

There is here, of course, a double obligation for the school. It should reduce so far as possible the occasions for resentment and retaliation by understanding and fair dealing. And it should teach and reward more satisfactory forms of social behavior among children, such as explanations, apologies, restitution, and group participation. In addition, it can open up legitimate avenues for counseling to aid pupils in meeting their difficulties and so avoid the frustrations that have produced the aggressive, retaliative behavior.

[5] Florence L. Goodenough, *Anger in Young Children*, Minneapolis: University of Minnesota Press, 1931.

Persuasion. Inanimate objects, like ˌwalls to be scaled, rivers to be crossed, or mountains to be climbed, do not yield to persuasion. But when a person is responsible for the frustration, and it is not desired to use aggressive tactics, various means of persuasion are employed to induce him to remove the obstacle, furnish help in surmounting it, or at least to withdraw his opposition. The methods of persuasion are ethically somewhat less questionable than aggression and usually imply a better personal adjustment, and as a rule are more effective in the long run. They are all quite commonly employed and should be recognized for what they are—means of satisfying needs and of attaining success. They may be classified under the following heads: gratuity, appeasement, sympathism, cajolery, argument, and conversion. A first kind of persuasion is by means of *gratuity;* the individual pays in goods or services for the assistance he desires. The most blatant form of payment is bribery, which, when practiced on a large scale, reveals the encroachment of degeneracy upon a culture. Any ingenuity that teachers and administrators can employ to lead pupils, when they grow older, to demand integrity on the part of their public servants should certainly be encouraged.

A more delicate but still questionable form of gratuity is flattery. The latter was the technique used by the fox to secure the piece of food the raven was carrying in her beak. It is so commonly employed and sometimes so artfully administered that the recipient may not realize it is being used. Merchandizers meet sales resistance by referring to "discriminating customers," and "apple polishing" may be so charmingly and yet so flagrantly practiced that honest students hesitate to be ordinarily polite to their instructors for fear of being suspected of ulterior motives. Flattery, like bribery, is intended to give satisfaction to the recipient and place him under obligation with the result that favors are expected in return.

Appeasement has long been practiced, particularly as a means used by the weak to placate the strong. "Give him what he wants," is an easy solution to a problem, and may be the only possible one. But it is dangerous, because the demands will never be satisfied, whether they be made by powerful nations or by troublesome children. In the political sphere, a common form of exchange of services has long gone by the name of log-rolling. At times it is difficult to distinguish it from compromise and cooperation. "You help me, and I'll help you," is a fair and often effective procedure and is questionable only if the obligations are not met or if the objectives are dubious.

Another form of persuasion, called *sympathism,* is in somewhat of a

class by itself. It is the technique of getting what one wants by arousing sympathy by seeming helplessness or a hard-luck story. It is the "poor me" device, calculated to call forth the generous impulses of the stronger, more fortunate, or more capable. Children have been known to get teachers to do their lessons for them in this way, and parents sometimes do more for their children than is needful, tending to render them dependent or helpless when the time comes for them to be cast on their own resources. Young men are sometimes thus "taken in" by the fairer sex, husbands by their wives, charitable groups by poor families, and healthy members of a family by ailing members, who sometimes make virtual slaves of the whole household. While the less favored may deserve help, the individual becomes a dupe who allows himself to be fooled by inordinate demands upon his sympathy, and he loses the respect even of those whom he tries to help.

Cajolery, as a means of attaining one's ends, is a complex technique which seems to come readily to the politically minded. It is a combination of geniality and flattery, implying acceptance in a prestige group, coupled with vague promises and a general playing-down of the importance of the difficulty. The object of this kind of attention may eventually find that he has been "played for a sucker," as the phrase is, and may regret that he has been talked into doing something that he didn't see the implications of at the time. If one is likely to be taken in in this way, it is probably wise to cultivate the habit of putting off any decision until he can think it over and find out what is behind it.

As in most of the other forms of persuasion, the cause or objective may be harmless or even admirable, and there may be definite benefits to all concerned. This is equally true of the so-called *luncheon technique*. Eating together, in some subtle way, partly physiological and partly cultural, reduces the tensions and resistances, and in general makes one more amenable to persuasion if not to reason. The results obtained by discussion over a luncheon table are apparently more satisfactory than those arrived at over the desk or counter. This method is sometimes used to bring recalcitrant customers, or board members, into line. A luncheon tends to promote harmony among the participants, and refreshments dull the points of controversy among the partakers at social gatherings, including parent-teacher association meetings. Group singing has a similar effect in establishing or strengthening a pleasant we-feeling and is employed by religious and political organizations and luncheon clubs and youth groups for this purpose. Like other instruments, cajolery is neither good nor bad in itself, the value being determined by the use to which it is put.

From the point of view of the intellectual, the only acceptable means of persuasion is the logical *argument*. He wishes to know the reasons for and against a proposition or a course of action, the alternative choices, and the implications of each. It is readily admitted that many decisions do not call for such detailed analysis, since they occur in a familiar setting and the consequences would not be serious in any case. Those who weigh minor decisions, such as where to eat, what book or article to read, whether or not to go to a movie, or which shoe to put on first, reveal a neurotic tendency called hypochondria. But a course of action involving an outlay of time or money or both, or affecting the lives of others, needs to be supported by good arguments for undertaking it.

And yet, peculiarly enough, in many situations logical reasons are about the last things people are interested in, a fact to which campaign speeches and popular advertising bear ample testimony. And when personalities are involved it may arouse counter argument, bitterness, and even added opposition. The man who has the poorer argument, instead of being overawed by his opponent's unassailability, is placed in an inferior and hence defensive position, from which he may feel forced to employ some of the tactics of belligerency and aggressiveness to overcome his feeling of frustration and re-establish his status.

The final means of persuasion that is here discussed is *conversion*. The object is to bring about a whole-hearted acceptance of one's point of view and so gain support in place of opposition. The simplest means of conversion is by an attitude of good will. The process is a gradual one of acceptance. An individual may join certain clubs or societies and conduct himself in a way that is admired by his opponent and so create a friendly relationship between them. An organization, by a program of social interpretation, is wise to inform the public in general and its constituents in particular as to what its plans and activities are if it is to gain their support. A more direct attack on the problem may be made by singling out individuals, and by a combination of enlightenment, cajolery, and argument seek to convert them to one's side. In this procedure prestige value is important, and the individuals, by a process of identification, become what those about them are.

The term conversion is used by psychoanalysts to refer to the process by which repressed mental states or conflicts are transformed into the physical symptoms of neurasthenia and hysteria. The patient thus seems to be able to escape from the strain or shock he has experienced into a calm, although morbid, state. Conversion to a cause, be it religious, political, or any other, while it may have some relationship to this process, seems rather to suggest a regression to a childhood period in

which simple faith in adults protected the child from conflict and strain. If this is true, then the process would be one in which escape is found from confusion and frustration, and in which one's manifold desires and needs can find satisfaction. The convert, then, has found a value system which is more in harmony with his own, and on the basis of which he can think and act.

Rationality. If one is to meet frustration successfully and so obtain the satisfaction of one's desires and needs, the situation should obviously be viewed as a problem calling for a rational solution. It may be that some kind of escape is the wisest procedure to follow, or perhaps some form of compensation is best. If it seems most sensible to meet the frustration head on, as it were, the choice of means to cope with it must be made with due consideration for the probable consequences. Reflective thinking will be discussed in detail in a later chapter. Suffice it to say here that the process involves an analysis of the difficulty, a consideration of possible solutions, and an appraisal of one's competence in following the chosen course.

The fundamental necessity, however, in the rational solution is that of *facing reality*, of seeing things as they are. This is probably the most difficult task that man can set himself. He is and always has been an intrepid follower of illusion. But, as scientific investigation is tending to banish the more obvious forms of superstition, so the individual, with the help the school can give, can learn to do away with the more blatant forms of self-deception. The greater part of man's waking time is spent in the process of satisfying his various needs and in catering to his other wants and desires. It is clear, then, that from this point of view the first function of education is to help its younger citizens to *discover the things which they actually need*, that their desires may—in part, at least —be in this direction.

But the second function of education is perhaps more important still; it consists in helping the pupils *to discover the best way to satisfy these needs*, or, in other words, to discover the best way to respond when their efforts to satisfy them are frustrated. In this chapter many very common ways of doing this have been discussed—the infantile emotional outburst, the intellectual evasions, the imaginary escapes, and the more morbid mechanisms, which have only been alluded to, as well as ways of compensating for and ways of actually meeting frustration. What are the kinds of situations the school presents which can be used to assist pupils to make the more intelligent and rational forms of adjustment?

4. THE SCHOOL AND PUPIL ADJUSTMENT

Pressure and Frustrations. The term environmental pressure is used by mental hygienists and psychiatric workers to refer to the conditions which compel certain kinds of responses that are not in the direction an individual desires. A powerful football line exerts pressure directly against the opposing team; but quite as direct and effective pressure can be exerted without physical contact, as in the case of a hold-up man with a revolver. Superior officers or organization members similarly compel compliance, but more indirectly and politely. The pressure, however, can also be quite impersonal, as when a tired traveler "must" get to the next town before nightfall, or in the nearly universal necessity of working for a living. Adjusting to reality consists partly in recognizing the desirability of yielding to some of these pressures instead of opposing them. However, if too many forces crowd in on one at the same time, or if they push in different directions, so that he doesn't know which way to turn, the individual becomes baffled, and frustrated, with the consequences already described.

Children in school are subject to a number of such environmental pressures, most of which are undoubtedly mild enough to be dealt with satisfactorily. Among these are the more or less impersonal ones such as general school regulations, with which most children are willing to comply—regulations as to attendance, tardiness, care of equipment, and general deportment. There are also many instructional pressures— assignments, home work, scholarship standards, study regulations, demands for taking part in class discussions and activities, for recitations, examinations, promotions, and the like. Some of these cause serious frustrations for the timid, for the backward, and for those whose aspiration level is too far above their ability. Ability grouping and individualized instruction tend to reduce the intensity of some of the pressures.

Back of all these conditions, however, is the personal compulsion of parents, teachers, and of the individual himself. Various kinds of expectations, requests, orders, and commands operate as frustrations to the wants and desires and sometimes to the needs of pupils. The situation is intensified by the dislike of the pupils for those of their teachers who are viewed as the cause of their frustrations. Aggressive and rebellious attitudes on the part of pupils then serve as frustrations to the teachers, who sometimes act as if they are in danger of losing the recognition and status they believe to be rightfully theirs. As has been pointed out, they feel called upon to "show their authority," they may react emo-

tionally and perhaps aggressively, thus increasing the tension, and a first-class disciplinary situation develops.

Discipline. The word discipline in school parlance has lost its proper meaning of teachings or doctrine, and refers to the ability of a teacher to keep order and impose his will upon the pupils. It is granted at the outset that pupils' needs cannot be satisfied in a disorderly or rebellious group; but two important considerations present themselves from the socio-psychological point of view: (1) Does the teacher himself contribute to the disorder, and (2) What means of regulation should be used? Some teachers by their very incompetence encourage perfectly normal children to become mischievous, a condition which establishes pupil superiority and provides an escape from the tasks at hand. If successful means of coping with such behavior, whether firm or friendly, or both, are not found, the school time and the taxpayers' money are being wasted. Some teachers magnify small incidents, viewing minor rebelliousness as "insubordination," and create a scene unnecessarily.

One case has been reported of a boy who wore a coat in school to conceal a slight spinal deformity about which he was sensitive. On a warm day, the teacher, not knowing about this, told him to take off his coat. The child demurred, at which the teacher became angry and scolded him for his "disobedience." The boy naturally resented her attitude, and with tears in his eyes got up and started for home. The teacher shouted to him to go to the principal's office, but he paid no attention. The fact that his parents and the principal were understanding people, and that it was arranged that the boy should wear a lightweight coat on warm days, does not excuse the teacher for creating a disturbance, humiliating the pupil, and wasting her time, that of the principal, and of the other pupils in the grade over a situation which need not have occurred at all.

Regulation. It is not appropriate here to elaborate the various techniques of regulation, but rather to consider in this connection the two primary principles of control which have been discussed earlier, the autocratic and the democratic. These principles operate to a greater or lesser degree whether disciplinary situations are severe or mild, or do not occur at all. Both may employ the regulation of tasks, and may apply to groups or to individual cases. The difference, as has been earlier stated, lies in the source and direction of the control. The autocratic follows a direct line between teacher and pupil, making one the master, the other the slave, resulting in subservience, rebellion, or

escape. The democratic way involves a more complex pattern of organization or structure, which springs from group interaction and provides group control. The teacher becomes a member of the group that exerts control over itself instead of being an enemy, an out-group member, endeavoring to impose regulation by force.

Naturally, group control cannot be handed over at once to pupils accustomed to the autocratic way, for democratic procedures must be learned like other individual and social coordinations. Nor can democratic forms (student council, etc.) be successfully used for any length of time to mask autocratic management. Pupils, and teachers too, soon realize that they are being deceived. But a democratic program of control gradually introduced, with guidance and help in its operation, can create a form of organization which not only "maintains order" but provides a spirit of cooperation, a "we-feeling" that is positive instead of negative in its effect. It also gives practice in the ways of democracy which is badly needed in a world where dictatorial methods can so easily become powerfully operative.

5. SOCIAL ADJUSTMENT

Maladjusted Adults. The problem of adequate adjustment boils down to the intelligent selection of means to satisfy needs, in contrast with the all-too-human method of trying to find ways to get what one wants. The task is sometimes more difficult for the young adult than for others because he is so recently weaned from subservience to parental help and direction. Students of college age are likely to do whatever is being done around them on the assumption, supposedly, that those are the things to do. Various forms of commercial amusements, games, or jobs which happen to be lying around are chosen, and are confused with "life" in preference to a course of action the value of which the individual may not appreciate. In the face of environmental suggestions and pressures, he has not learned to make his own choice, or he has not thought out and carried through an adequate solution for his difficulties.

A college student was dissatisfied with his course. Though seemingly intelligent, his work was of inferior quality. He hated the routine and the tasks set. He cut classes quite regularly, tried a rather heavy social life without satisfaction. Finally, he organized a little group of people interested in dramatics, with the result that before the year was over he had very creditably produced a couple of plays before good-sized audiences. His need for effective effort and social recognition had not been satisfied until he hit upon this means.

A college graduate in her first year of teaching, like so many others, found difficulty in maintaining discipline. She was a teacher of science, and the laboratory period was most disorderly. She might have employed any one of a number of defense reactions, explaining her weakness by ingenious rationalizations, or in imagination picturing herself as the director of a big, smooth-running university laboratory. Instead, she systematized the procedure of distributing notebooks, listed additional apparatus that was needed, and herself went with the principal to the superintendent, with the result that most of the supplies she wanted were purchased. She had four of the most troublesome pupils transferred to classes better adapted to their abilities and needs. She had confidential talks individually with three other trouble-makers who were properly placed, and also with the other pupils, in some cases enlisting parent cooperation. The good teaching methods were then in a place where they could operate; the soil has been prepared. Her success would seem miraculous to one who did not know how it was achieved.

As has already been intimated, many teachers are themselves more or less seriously maladjusted. If one of their objectives is to help in the adjustment of their pupils, such teachers are blind leaders of the blind, for they have not acquired the lessons they are expected to impart. It is impossible to present data to show the proportion of teachers who are maladjusted, for there is no objective method of designating how serious maladjustment must be to be so classified. Many factors, however, contribute to the situation—the selection of a relatively larger number of sexually inhibited individuals, the imposition of social pressures by the community, the institutional nature of their existence, and continuous contact with immature minds. A number of solutions have been suggested, among them the inclusion of a larger number of married teachers, the relaxing of pressures which are not employed against other community members, wider participation in school and community affairs, more rigid and thorough training and selection, and higher salaries, particularly at the top, salaries more nearly commensurate with those obtainable by the leaders in other professions, medicine and law, for example, in order to recruit the more competent. Whatever the means employed, an adequate educational program cannot be carried on by those who meet social problems emotionally and irrationally instead of meeting them intelligently and realistically.

School and Home Cooperation. One of the discoveries that teachers are apt to make quite early in their careers is that many parents are rather badly maladjusted too. When they are not criminals, drug ad-

dicts, and psychopaths, they may be living under abnormal economic tension, whether poor or well-to-do; they may be fearful, hypersensitive, quarrelsome, or mixed up in divorce difficulties. Fathers may be drunken, cruel, or preoccupied with business; mothers may be overworked or lazy or idle, with perhaps unwholesome fixations on their children. But there is this difference between their position and that of the teacher—the children belong to them, and they are morally and legally responsible for them, not only at the moment, but for the several years to follow. Teachers come and go and are naturally not taken as seriously as they usually think they should be. But the teacher's influence is important, nevertheless, and it can be more important than it usually is, providing a harmonious relationship exists with the parents. In the majority of cases, the cooperative nature of the parent-teacher task is taken for granted; sometimes problems arise which necessitate conferences, in which the teacher is the consultant only, clarifying the situation, indicating what the school's program for the particular child is, and the reasons for it, endeavoring to win support but yielding to parental demands in so far as they do not conflict with intelligent school policy.

Environmental Control. Even such a part-time program as the school provides creates a kind of environmental control over pupils quite apart from the choice of educational procedures employed. The time of the pupils is occupied with different kinds of tasks both in and out of school, and these are often sufficiently compelling to draw them away from less valuable activities in which they might engage. During the summer, and during the year following the time when pupils leave school, a noticeable increase in juvenile delinquencies occurs in spite of the hold that homes, churches, and other institutions have over many of them. This fact suggests the desirability of continuing the school influence in some way, so that, in the face of the environmental pressures which young people have not matured sufficiently to withstand, it may still aid them while they are learning their way around in the wider and more complex structure of adult society. Schools do this for the youth who go on to college, often helping them in making the transition and maintaining contact with them through their freshman year. They are less likely to do this for those who go to vocational or continuation schools before graduating, while the record for those who drop out to seek jobs successfully or unsuccessfully is, as a rule, one of neglect. If the structure of the school is such that pupils think of it as an institution to "stay with," even though they do not

attend, instead of one to "get out of" as soon as possible, the stage of marginal social development could no doubt be made more satisfactory for themselves as well as for society.

Guidance. As stated earlier, the teacher must be a case worker, for he will have to diagnose behavior difficulties and recommend and carry through plans for remediation. For the great majority of children this presents no insuperable difficulties if the teacher employs a clinical approach instead of descending on the hapless youngsters with the wrath of Jove and all the assurance of divine revelation of an Old Testament prophet. However, with large groups of children to deal with, some of them requiring considerable attention, the clinical work of the school is tending to become specialized. Guidance workers, visiting teachers, and psychologists are found in many schools, and, in the larger communities, psychological clinics.

The *guidance worker* is usually a teacher who has been found to be successful in dealing with children and who has had a little—usually too little—training in the field of educational psychology. Yet, through the homeroom organization and by individual counseling, such a person is able to supplement the work of the regular teachers and furnish the needed help when educational choices are being made. In interviews he is often able to discern the children's needs and the conflicts they are trying unsuccessfully to resolve, and suggest ways to help. He can bring supplementary information to bear on their problems, such as their performance on standardized tests and conditions in their home background, and so gain a better understanding of their difficulties and adjust the school program more adequately to their needs.

Guidance, as such, is generally found on the secondary level, while *visiting teacher* work as a rule is concerned with similar problems on the elementary level. In the undepartmentalized grades, the teacher usually comes to know the pupils rather well, but seldom has time to visit the homes. Without the understanding of the home situation, it is difficult to appreciate some of the difficulties the children face in their efforts at adjustment, while with this understanding the conflicts can often be reduced and a more harmonious program provided.

The *school psychologist* should be trained to administer and interpret the several standardized tests which give more detailed information concerning children's nature and abilities than can be obtained by less objective methods. But he should also be able to conduct interviews on a more professional plane than should be expected of the guidance worker. *Counselling* should reveal some of the hidden motives and

conflicts that lie at the root of the more serious maladjustments and seek to reconcile them in such a way that improvement results. The so-called *non-directive therapy* developed by Rogers emphasizes a technique which has importance for all guidance workers, however, and that is to allow the pupil, so far as possible, to discover his own difficulties, and in the counseling situation to suggest and work out his own solutions.[6] A solution imposed by the counselor may not be a wise one, and, even if it is, it may not be accepted as such by the child and may even be resisted. If the child arrives at the same solution himself, he is far more likely to act upon it.

In many communities, a *psychological clinic*, sometimes called a child guidance clinic, conducts group testing for the schools, administers individual tests, and provides counseling services for children and parents. The help that such a clinic can render is greatly increased when teachers are well enough informed to be able to cooperate and to use the services that the clinic is set up to provide.

Psychiatric treatment is needed as a rule when children develop neurotic symptoms and are too disturbed to profit from school attendance. However, there is no sharp line that can be drawn to separate the normal from the abnormal, either on the basis of diagnosis or therapy. But many valuable leads from the treatment of neuroses and psychoses are of value in less extreme forms of maladjustment. Among these, brief mention should be made of group work which is sometimes called *group therapy*.[7] Whereas the traditional therapy is carried on through the medium of individual counseling, this technique provides for the direct observation of interpersonal behavior. Under skillful direction repressions may be released and conflicts resolved in the processes of group interaction, at the same time that more satisfactory modes of response can be acquired. The practice of group therapy is still young, but it holds out considerable promise to education, for the teacher who is in charge of a grade or class is in reality a group worker, and his skill in improving the adjustment of the pupils will be enhanced as the techniques of group work become better developed and more widely understood and appreciated.

The Place of Ideals. It might be supposed that the child has learned in school how to adjust to reality, and that, if later he fails to do so,

[6] Carl R. Rogers, *The Clinical Treatment of the Problem Child*, Boston: Houghton Mifflin, 1939, Chapters X and XI; and *Counseling and Psychotherapy*, Boston: Houghton Mifflin, 1942, Chapter V.

[7] S. R. Slavson, *An Introduction to Group Therapy*, New York: Commonwealth Fund, 1943.

it is his own fault, or that of his home environment. But adjustment is a continuing process and is carried on in relation to the environment in which the individual is living, not the one in which he has lived. There are, of course, similarities between the two, though these are not always as noticeable as the differences. Being out from under the eye of the teacher suggests a freedom that does not exist if one is to make the best of his potentialities, be they great or small.

The force that links the new environment with the old, however sharp the contrasts may be, lies in the imagination. Freud has described the superego as that mental structure, taken over imaginatively from the parent, which accepts or rejects the dynamic promptings of the id. The child in his decisions in a real sense becomes the parent. But this function is borrowed from others as well. McDougall has somewhat picturesquely described "the ideal gallery" filled with people who are living or have lived, who say to an individual, "No, you can do better than that," or who perhaps nod with approval at his choice. Relatives, friends, and former teachers may occupy this imaginary gallery above the stage upon which the individual struts and frets his hour. "Mr. X wouldn't stand for such a sloppy job," a young man might say to himself, or Miss Y used to say, "You can get it right if you stick to it," or "Dr. Z wouldn't have anybody around who has a shoestring for a backbone." Many such homely sayings as these, spoken by teachers who are respected, and perhaps loved after a fashion, have enabled young people to withstand environmental pressures in the absence of institutional control and to maintain their adjustment to their world. It is such psychological stuff that ideals are made of; and a teacher has the responsibility of helping to construct them if pupils in school and afterward are to meet their frustrations and make their adjustments successfully.

In Summary

When blocked or frustrated in satisfying their needs and in attaining their desires, people respond in various ways that the intelligent person can recognize in himself and in others. If he is responsible for the education of young people, he must be sensitive to the mechanisms they employ so that he can help them to acquire more satisfactory modes of adjustment than they otherwise would.

The mechanism of escape includes not only leaving the scene, but also avoiding blame through rationalizations of various sorts, daydreaming or fantasy, and repression. The latter has been considered

the cause of various neurotic symptoms analyzed by Freudian psycho-analysts and other psychiatric workers.

The mechanism of compensation involves finding other goals and satisfactions than those one is frustrated in attaining because of a felt inferiority. The doctrine, elaborated by Alfred Adler, is well adapted to educational practice since it suggests a possible program of legitimate satisfactions, including those attainable through cooperation.

One may meet frustration by resigning himself to failure, sometimes wisely and sometimes unwisely. More direct and overt ways are numerous and are classifiable as aggression, persuasion, and rational thought processes (Chapter XII). When employed in some situations and in appropriate ways, most of these mechanisms of adjustment, whether mental (autistic) or overt, are harmless and sometimes effective. Most of them, however, if employed excessively or inappropriately, are harmful, ineffective, and sometimes contrary to the moral code.

One of the functions of the school is clarified by this exposition—that of contributing to the mental health of the students. Various techniques for the purpose include reducing pressures and frustrations in order that habits of desirable adjustment may be formed, providing adequate direction and control, developing home cooperation, and furnishing guidance in making life adjustments.

Questions

1. Observe a class and note the kind of regulation employed, and the presence of any problem cases. Find out more about one such case from the teacher and homeroom teacher.
2. How can ways of student self-government be learned? What would be some of the stages?
3. Describe some of your daydreams or those of your friends. From what conditions do you consider they are an escape? To what extent might they be considered life planning?
4. List a number of rationalizations you have heard. Do you use any? Cite cases, if possible, in which you think the use of rationalization is justifiable.
5. Compare the concepts of the superego and conscience.
6. What are the common causes for a feeling of inferiority? What are some of the things that children do to compensate? If possible, describe the case of some child who compensated for inferiority in antisocial ways. What was done about it? What can the school do?
7. Show how the Adlerian view is more readily adapted to school

use than the Freudian. What is meant by saying that the former explains too much?

8. List the things a boy or girl might say upon failing to make an athletic team, or failing to win a prize, or when asked why he didn't go to college.

9. Show the relation of the following to the material of this chapter: alcohol; opium; Cinderella; success stories; gambling; heaven; hell; "alibi"; "kidding one's self along"; "passing the buck"; scapegoat; euphemism; the devil; fate; luck; fortune; Nature; Adam.

10. Suggest cases illustrating wise and unwise aggressive behavior.

11. What can be done to assist the pupil to adjust adequately by the psychological clinic? by the teacher? by the principal? by the athletic coach?

12. Show advantages and disadvantages, if any, of the following in the matter of proper pupil adjustment: (*a*) fraternities and sororities; (*b*) avocational clubs; (*c*) athletics; (*d*) physical education; (*e*) school dramatics; (*f*) ability grouping; (*g*) prevocational courses; (*h*) adequate teacher training.

Readings

Freud, S. *Introductory Lectures on Psychoanalysis.* London: Allen and Unwin, 1923; and *New Introductory Lectures on Psychoanalysis.* New York: Norton, 1933.

Often it is better to read what the master has written than to read what others say about it. Psychoanalytic concepts are elaborated by the founder. The second volume is the better choice if only one is read.

Fry, C. C. *Mental Health in College.* New York: Commonwealth Fund, 1942.

An excellent volume concerning the social, family, and sexual conflicts and problems confronting college students. Uses the case-study approach in depicting, diagnosing, and recommending therapy for adjustment difficulties.

Guthrie, E. R. *The Psychology of Human Conflict.* New York: Harper, 1938.

Emergence of emotional conflict from frustration of habits, motives, and interests. A detailed study of mental disorders and their genesis from family and social conflicts.

Hart, B. *The Psychology of Insanity.* Cambridge: University Press, 1912. (Rev. ed., 1941.)

One of the earliest books to present the modern view, small in size, yet still a good source for the layman.

Healy, W. *Mental Conflicts and Misconduct.* Boston: Little, Brown, 1917.
A pioneer book in the field that is still in advance of common practice.

Heidbreder, E. *Seven Psychologies.* New York: Appleton-Century, 1933.
Chapter X gives a description of the psychoanalytic view.

Janet, P. *The Major Symptoms of Hysteria.* New York: Macmillan, 1920.
Still an authoritative source and a most interestingly written volume describing the strange ramification of symptoms of this affliction.

Jung, C. J. *Modern Man in Search of a Soul.* New York: Harcourt, 1939; and *The Integration of the Personality.* New York: Farrar and Rinehart, 1939.
The first reference reveals Jung's approach and is interestingly written for the lay reader; the second is more technical and detailed.

Low, B. *The Unconscious in Action.* London: University of London Press, 1928. Book published in the U. S. as *Psychoanalysis and Education.* New York: Harcourt, 1928.
A simplified presentation of the psychoanalytic view with considerable illustrative matter and applications to school and home situations.

Morgan, J. J. B. *The Psychology of Abnormal People.* New York: Longmans, 1936.
A readable textbook on abnormal psychology.

Murphy, G. (Ed.) *An Outline of Abnormal Psychology.* New York: Modern Library, 1929.
Excellent chapters by leading writers in the field of psychiatry.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology.* New York: Harper, 1937.
A study of the attitudes of teachers toward behavior problems (pp. 96–101) and a few thumbnail sketches of college alumni revealing the need for a mental hygiene program at the college level (pp. 415–418).

Preston, G. H. *Psychiatry for the Curious.* New York: Farrar and Rhinehart, 1940.
A brief, humorous, illustrated study of psychiatric terms and techniques. Various behavior mechanisms treated somewhat superficially but very strikingly.

Robinson, J. H. *The Mind in the Making.* New York: Harper, 1921.
The first elaboration in English of the concept of rationalization, which the author apparently took from Pareto.

Ryan, W. C. *Mental Health through Education.* New York: Commonwealth Fund, 1938.
The rôle of various members of the school staff in the mental health

program (teacher, supervisor, administrator). Recommends school, family, and community integration for mental health success. Diagnoses weak spots in school mental health activities.

Sayles, M. B. *The Problem Child at Home*. New York: Commonwealth Fund, 1928.

An informal nontechnical presentation of the emotional satisfactions which parents and children seek in one another and mistaken ideas which influence parent-child relationships.

Shaffer, L. F. *The Psychology of Adjustment*. Boston: Houghton Mifflin, 1936.

A textbook in mental hygiene from which chapters might be selected on the basis of individual interest.

Sherman, Mandel. *Mental Hygiene and Education*. New York: Longmans, 1934; and *Mental Conflicts and Personality*. New York: Longmans, 1938.

The earlier volume describes the various behavior mechanisms and the rôle of education in readjustment. The later volume classifies mental conflicts and describes their development from frustration of the self, society, and sex drives.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.

Chapter XXIII (pp. 522–541) discusses certain aspects of mental hygiene, particularly as they relate to conduct disorders.

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

Short sections dealing with different phases of analytical psychology by Healy, Jung, Adler, and others, pp. 831–836.

Strecker, E. A., and K. E. Appel. *Discovering Ourselves*. New York: Macmillan, 1946.

A popularly written but essentially sound treatment of the fundamentals of mental hygiene.

Wallin, J. E. Wallace. *Minor Mental Maladjustments in Normal People*. Durham: Duke University Press, 1939.

An interesting, casebook treatment of normal adjustment difficulties.

Winkler, J. K., and W. Bromberg. *Mind Explorers*. New York: Reynal and Hitchcock, 1939.

Chapter XV is a biographical sketch of Freud in a sprightly vein, and traces the development of the psychoanalytical movement.

Woodworth, R. S. *Contemporary Schools of Psychology*. New York: Ronald Press, 1931.

Chapter V gives a description of the psychoanalytic view.

Growth and Development

A BASIC characteristic of any organism is that it matures, that changes in it normally occur with time. This maturation factor is of course reflected in the usual system of grading and promotion, but it is fallacious to assume that all the children in the same grade in school are at the same level of development. Instead, each child matures at his own rate, and the grade he is in, or even his age in years and months, is only a rough indicator of the nature and extent of the developmental changes that have taken place.

Both biological and environmental factors influence the rate and direction of development. One important set of biological factors is found in the general health condition of the pupil. Physiological defects of pupils should be noted in order that they may be corrected if possible, and if not, that adjustments may be made for them in the school program. Hereditary influences are also of concern to the school, particularly in their effect on intellectual development, which is recognized as being largely a function of physiological growth.

The measurement of intelligence provides an interesting example of the scientific approach to educational problems, furnishing as it does an important criterion for adapting school programs to the abilities of pupils. Their increasing competence in performing school tasks is likewise measured in various ways, and these measures, called achievement tests, can provide further help in evaluating the school program, and in determining the extent to which its objectives are being attained. In the next three chapters, some of the more important information about these factors of change is presented together with some of the concepts employed in their measurement.

Health and Growth

Child Development. When parents look at their children they see more than the teacher usually does. For parents see them not only as they are at the moment, but also as they have been—as nursing infants, as toddlers to be kept from falling down stairs, as patients with the doctor gravely examining their throats and ears, as petulant convalescents, as explorers in the attic and the yard, as growing individuals who are "getting so they can" do things that they couldn't do before, and as personalities resembling an aunt, a grandfather, or perhaps themselves. In short, they see them as they have been, as they are, and also as they may become. Occasionally a teacher lives in the same community long enough to obtain such a developmental view of the pupils who pass through the school. As a rule, however, he has no opportunity, in the few minutes a day for the semester or a year they are in class, to know anything of the health history of his pupils, their progress in social development, or the facts of their physical and mental maturation. Only recently, indeed, has any effort been made to record successive observations or obtain consecutive measurements of any sort. Yet the teacher needs such data at hand if his judgment and advice are to be truly professional.

One advantage that the teacher does have over the parent, however, is experience with a considerable number of children at approximately the same stage of development. Conditions of growth and kinds of behavior or conduct which a parent might believe to be unusual, a teacher would perhaps recognize as quite common; also, characteristics that a parent might take for granted might be recognized as indicating a condition requiring attention. But to such experience the teacher must bring professional knowledge concerning physical health conditions and mental and physical growth. These are the biological factors that influence behavior in general and learning in particular, and to which it is desirable and necessary for the school to adapt its program.

231

1. The School and Pupil Health

Plant and Equipment. Many schools have been derelict in their duty of providing for the health and physical safety of the pupils. Fire hazards still exist, fire drills are often ineffective, and fire equipment has been allowed to molder and decay. Lighting is often bad, and ventilation non-existent, the "school smell" even lasting over the summer vacation to greet the returning pupils in the fall. Some school kitchens will hardly bear inspection, and the same is true of gymnasium locker-rooms and toilets. Even expensive new school buildings are not always kept in proper condition, though safety, adequate lighting, ventilation, and sanitary conditions need not wait for a new building. If individuals responsible for such matters in a given school do not seem to be concerned about it, a homeroom or a student council, if the matter is wisely handled, can start a clean-up campaign to provide hygienic living conditions. There is no need to handicap the pupils in their progress in learning by maintaining a nuisance on the premises.

The School Program. The school curriculum should include provisions for adequate knowledge of how to maintain health and physical efficiency and for the development of good health habits. Adequate *health knowledge* is an important first step, for in many kinds of situations people are glad to do the right thing if they only know what it is. Hence, existing courses in science, and particularly in biology, physiology, and hygiene, can well be surveyed with a view to providing information that children want and need. This applies not alone to sex hygiene, about which pupils are often unnecessarily disturbed, but also to such matters as digestion and proper diet, to exercise, sleep, and relaxation, and to medication and the treatment of minor injuries. The enormous sale of patent remedies that do no good, to people who have once been to school, bears abundant testimony to the weakness of instruction in this area, as do the questions children ask when given a chance, questions which are not answered in the textbooks they read or the courses they take.

The inculcation of proper *health habits* has been definitely undertaken by nursery schools, but above this level the problem is apt to be neglected. The elementary school period is the time when these habits may well be developed and proper attitudes formed in order that they may carry over to later school years and to life situations. Personal cleanliness can be checked by inspections, but without "prizes" for the cleanest or for those reporting the most baths! Matters of diet cannot be so easily checked, though an attractive cafeteria with good food, a mid-morning

lunch for some, and information about proper foods, can help. It is not so easy to discover malnutrition as was formerly supposed since a child who is under the average weight for his height may be normal. But height and weight records should be kept, nevertheless; and, when malnutrition is suspected, a school physician should investigate. Regular physical and dental examinations can serve to indicate needs in these areas, and caution can be emphasized to promote safety in connection with play apparatus as well as with traffic. Many children come from homes where it is impossible for them to get enough sleep. This and other health matters often call for home cooperation.

General physical condition is often neglected both at the elementary and at the high-school level. An intrenched athletics program that is definitely harmful to many pupils often negates the efforts of those who have a broader concept of physical education. As a result, athletes are sometimes overdeveloped physically, while other pupils may be quite neglected, in spite of the fact that their bad posture, their undeveloped muscles, and their low physical energy demand attention.

An adequate system of physical examinations can form the basis for a continuous record of data on growth, including successive measurements of weight, height, and strength, and others if possible, such as the eruption of teeth. The data should be recorded in comparable units, probably age norms, to provide adequate growth curves against which to plot development in intellectual functions (as in Figures 22 and 23). In addition, tests of sensory acuity should be made, and a record of immunizations and illnesses kept. With such records available, a foundation for a proper understanding of pupil success and failure can be laid. Data would be provided for fairly dependable prognoses of future development, and more nearly adequate counseling could be carried on.

The Teacher's Part in the Health Program. Even a complete set of records is, of course, of no value if it isn't used. And it will not be used if teachers are ignorant of its value. The first requisite, then, is for the teacher to know the basic facts of child health and development. This information is often difficult to obtain because it is likely to be buried in advanced courses in biology with prohibitive prerequisites. But journal articles, books, and courses are appearing which make this information more readily available. On the psychological side, more and more attention is being given to longitudinal studies of child development, that is, successive observations and measurements of the same child over a period of years. In addition to such professional knowledge, it is expected that teachers will be able to cooperate in the giving of tests, par-

ticularly tests of psychological functions. And they should learn to recognize physical and mental symptoms that suggest the need for special treatment, and to furnish intelligent assistance to pupils who are frustrated in their adjustments by handicaps of different kinds.

2. PHYSICAL HANDICAPS

The Teacher and the Handicapped. A teacher must be able to recognize handicaps and to provide the most helpful environment for those who are thus afflicted. Some disabilities are not easily discovered, and some visual and auditory defects are such that the child himself may not know that others do not sense the world as he does. Since the symptoms are often indirect—not a feeling of eyestrain, for example, but headaches, nervousness, or digestive irregularities—the condition often is not diagnosed. Such children are sometimes considered stupid, or rude and uncooperative.

Handicapped children, as was earlier pointed out, are likely to develop feelings of inferiority, and to compensate in undesirable ways. This is particularly true of orthopedic cases, hunchbacks, cripples, and the like. Other children are apt to be unkind and cruel to them, and need to acquire more humane attitudes. The segregation of the handicapped with their own kind is no solution, since they are going to have to live in the world of more or less normal people. Hence it devolves upon the teacher, the regular teacher, to carry them along and assist them through their earlier difficulties.

Blindness. While only a relatively small number of children of public school age are blind or partially sighted (about one in 400), probably not too many to be fully institutionalized, a part of their education is properly carried on in connection with the regular classes for normal children. The reason for this is that the experience helps them to develop more normally than would complete segregation. It is generally agreed that the blind, except in cases where other afflictions such as feeble-mindedness or disease are also present, are in no way "peculiar." Any characteristics which might be so interpreted are the normal consequences of their efforts to adjust to their unseen environment. They are no less intelligent and healthy physically and mentally than their seeing friends, except as a restricted environment may have imposed limits to their development. But they do not have compensating gifts or a "sixth sense," except in the sense that they have learned to attend to, or to perceive or remember, stimuli which are commonly disregarded. The chief causes of blindness are three: hereditary factors; diseases, which

cause about four-fifths of all blindness; and accidents and injuries, which in spite of safety efforts are responsible for approximately one-sixth of the cases.

Special teachers trained for work with the blind are needed, particularly for giving instruction in reading Braille. This is a system in which the letters correspond to symbols made up of different combinations of from one to six raised points arranged in the same position as the six dots on dice or dominoes. The process of learning to read by passing the fingers over these raised symbols often results in considerable strain and nervousness. And learning to write by making similar raised marks with a stylus, which must be done backwards since they are punched from the reverse side of the paper, presents rather serious difficulties to the learner. The typewriter, however, affords a useful means of written communication, while the somewhat restricted reading lists in Braille are supplemented by phonograph recordings and by special dictaphone devices which take the place of lesson materials and mimeographed sheets. The necessary academic subjects can be thus handled, but an overemphasis on verbal materials should be avoided. Physical, social, and vocational needs require special attention and help from regular teachers, with emphasis in many cases on such areas as agriculture, industrial arts, and home economics.

Visual Defects. Those who can see, but whose vision is so defective that it cannot be corrected by lenses, are, or should be, treated according to the seriousness of their defects in special sight-saving classes. The object of these classes is to reduce the strain on the eyes and lessen the dependence of pupils on vision. The various methods of conservation employed and taught prevent the abuse which otherwise would lead in some cases to total blindness. Of the probably fifty thousand children needing such care in this country, however, only about one-tenth are actually receiving it. Medical care, a healthy physical education program, good distribution of light, and avoidance of all glare either direct or from reflecting surfaces, the use of books with very large type, and auditory dictaphone machine materials when available, combined with an otherwise normal social experience, are the factors of greatest moment in the sight-saving classes. In the regular classes partially-sighted pupils are constantly under a strain and require special consideration to keep their frustrations down to the point where they can be adequately met.

To avoid undue strain the degree of illumination should be higher for those with imperfect vision than is necessary for others—35 to 50 foot-candles is recommended. The *foot-candle,* which is measured by a pho-

tometer, is the unit of measurement of the intensity of illumination—that of one standard candle at a distance of one foot. A 60-watt incandescent lamp registers 80 foot-candles at a distance of one foot and about 20 at two feet.[1] But at six feet it is only two foot-candles, which is so little illumination as to be positively harmful. Ten foot-candles is too little for normal eyes except for large print, while around 20 is considered the minimum amount of light for reading.

At an early age people acquire the ability to use all the sense organs effectively enough for all practical purposes with the exception of the eye and ear. The distance receptors, and particularly the eyes, however,

TABLE 1 *Incidence of Visual Defects in the New York Schools*

GRADE	PERCENTAGE OF PUPILS HAVING VISUAL DEFECT
2	20.2
3	21.2
4	25.8
5	24.8
6	24.5
7	26.9
8	32.3

are put under such strain by the educative process that the teacher should be on the alert to detect symptoms which point to the need for special attention. The incidence of visual defects is variously estimated as ranging from 10 per cent to 70 per cent of the general population. The variation in estimate is due in part to local conditions, but chiefly to the differing standards employed for the designation of normal vision. The incidence in the schools has been found to show a fairly steady increase through the grades.[2]

Because of the difficulty involved in finding comparable groups outside the school, it is impossible to say how much of this increasing disability is due directly to the school itself, but it is undoubtedly enough to make

[1] Illumination is inversely proportional to the square of the distance. Thus at twice the distance from the light there is one-fourth the illumination, and at three times the distance from the light there is one-ninth the illumination.

[2] L. H. Gulick and L. P. Ayers, *Medical Inspection of Schools*, New York: Charities Publication Committee, 1908. (Russell Sage Foundation Publication.) Table quoted by permission.

the problem one of grave concern to every teacher and school administrator. School architects now give the matter the attention it deserves and design classrooms with one-third to one-fifth as much glass as floor space, the ratio recognized as necessary; and proper artificial illumination is furnished for dull days. Publishers recognize the importance of such matters as size of type, distances between lines, and quality of paper; and many states have made yearly visual tests obligatory, to discover the existence of unsuspected defects. Teachers see that children form correct reading habits, with the book at proper distance from the eyes, with sufficient illumination on the page, and with proper intervals for rest or recreation between tasks requiring close application. These things are important; for to neglect them is to place unfair barriers in the path of pupils. They may have headaches and nervous symptoms which they do not suspect have any connection with their eyes, but which may produce a dislike of school work that may develop into unruliness and truancy.

Some of the most common visual defects are the following:

Refractive Errors (ametropia)

Myopia, or nearsightedness, is of two kinds. Pathological myopia, the cause of which is not known, is very rapid in its development and requires the kind of care afforded by sight-saving classes. Functional myopia is more common, and usually progressive through the teen years. Frequent changes of glasses with concave lenses can usually keep the pupil's vision properly corrected. Myopia is usually due to an elongation of the eyeball with the result that parallel rays of light come to a focus in front of the retina. Distant objects are always blurred, though near objects can often be seen with great clarity. With the exception of the muscular effort involved in converging the eyes there is no strain, for sensations of eyestrain are caused by continued effort to make the crystalline lens more convex or globular for seeing nearer objects, which of course is unnecessary in the case of nearsightedness.

Hyperopia, or hypermetropia (farsightedness), is usually due to a shortening of the eyeball with the result that parallel rays of light come to a focus behind the retina. Near-by objects can be seen clearly only by the strained functioning of the ciliary muscle, the action of which is to make the flexible lens more convex. The necessity for this strain is removed by the use of convex lenses in glasses.

Astigmatism is the name given to an error in refraction produced by imperfect curvature of the cornea, or sometimes of the lens, resulting in blurred vision. Correction can usually be made by a competent oculist.

Presbyopia is the loss of elasticity in the lens with consequent diminishing power of accommodation and usually begins to appear from the fortieth to the forty-fifth year.

Muscular Imbalance (heterophoria or strabismus)

Esophoria is a condition of lateral imbalance in which the visual axis of one or both eyes tends to deviate inward, due chiefly to weakness in the muscles which move the eye in its socket. When the strain is too great to keep the eyes in focus, the defect becomes noticeable and the individual is said to be "cross-eyed."

Exophoria is a condition in which the axis of one or both eyes tends to deviate outward. The conditions are the same as in esophoria, though different muscles are weak. When the defect becomes noticeable, the individual is colloquially said to be "wall-eyed."

Hyperphoria is a condition of vertical imbalance in which one of the eyes tends to deviate upward.

Complex Defects

Diplopia (double vision) is rare; but children have been known to conceal this defect because they had been punished for saying they saw two objects when there was in reality but one.

Color blindness is a retinal defect resulting in the inability to distinguish certain colors, usually red and green. It is a sex-linked hereditary character, much more common in men than in women.

Aniseikonia is a condition in which the retinal images are of unequal size or shape. It is probable that this defect, which produces symptoms of eyestrain, and which is not diagnosed in the usual examination, is responsible for some troublesome reading cases.

Dyslexia, or alexia (word blindness), is the inability on the part of the individual to understand or interpret printed or written characters even though he can see them. Somewhat similar to aphasia, or the inability to distinguish spoken words, this defect is cortical and not in the end-organ. Children who suffer from such defects are apt to be incorrectly classified as feebleminded.

Testing for Visual Defects. Defective eyes should be examined by an oculist,[3] but it often devolves upon teachers to make preliminary tests. It should be remembered, however, that some children who pass the superficial visual test given without the use of relaxing atropine (from the belladonna plant) may have a serious defect which they try to overcome by fatiguing strain. Hence the teacher has to be on the lookout for

[3] An oculist (also, ophthalmologist) is a physician who specializes in diseases of the eye. An optician is a person who makes and sells glasses.

symptoms of strain such as spasms of the eyelids, itching, smarting or watering eyes, sensitiveness to light, frowning, and blurred vision. The latter, when suspected, can sometimes be discovered by asking the question, "How does the print look to you?" Some of the more general symptoms of eyestrain are headache, dizziness, exhaustion, indigestion, tics, and general irritability.

A number of tests are available which may be used by teachers in preliminary visual examinations. The Snellen chart is the most familiar, with its rows of letters becoming progressively smaller from top to bottom. The revision of this card made by the American Medical Association and the Snellen and Seitz charts for children and illiterates, the former with E's rotated, and the latter with pictures instead of letters, are probably the best for school use. Defects of vision are recorded in the form of a fraction, the numerator of which is the distance the child being tested stands from the chart, usually 20 feet, and the denominator the distance from which the normal eye can read the smallest line of letters the testee can distinguish. This distance is read from the chart. Thus if a child at 20 feet can read no line smaller than the one that can be read normally at 30 feet, the vision is 20/30. Normal vision would be 20/20.

Astigmatism can be noted by means of the usual astigmatism chart, showing heavy lines of equal width emanating from a central point. The astigmatic eye sees some of these lines as heavier or blacker than the others.

A more detailed examination, but yet one which a teacher can administer, employs standardized materials including an instrument known as the ophthalmic telebinocular.[4] It is obvious that errors of binocular vision can hardly be discovered when each eye is tested separately, as it should be, of course, for the usual errors of refraction. The telebinocular technique provides a means of testing for such conditions as distance fusion, binocular efficiency, imbalance, and sharpness of image.

Color blindness can be tested fairly accurately by the use of the Holmgren worsteds, a number of small skeins of different colored yarns. The testee is given a skein and asked to find another to match it. The Ishihara test affords a means of finer discriminations. It consists of a series of varicolored charts on which the normal eye can distinguish numbers that the color-blind cannot, and vice versa.

Deafness and Hearing Defects. It has been estimated that nearly 10 per cent of the population have impaired hearing, and that approximately

[4] E. A. Betts, *Prevention and Correction of Reading Difficulties*, New York: Row, Peterson, 1936.

one-third of these are school children. Hereditary factors, birth injuries, various diseases, and accidents are the chief causes. Deaf children are on the average retarded from two to three years, though retardation may be due in some instances to the same causes that produced the deafness. As in the case of the blind and partially sighted, it has been found desirable to provide as normal an environment as possible for the deaf and hard of hearing. Thus the task of dealing with these cases is not left entirely to the special teacher, but is partially assumed by the regular teacher, particularly in play and social activities. The deaf child is doubly handicapped in communicating with others because he lacks sensory control for vocalization, so that, without the training which gives him a kinesthetic control of his own laryngeal and nasal vibrations, he is also mute. The *manual method* of hand signs and pantomime for the letters of the alphabet, and also for whole words and phrases, is effective for communicating with his kind; but it does not open up the avenues of communication with those who cannot understand and use it. Hence the *oral method* is more satisfactory though somewhat difficult to learn. By this method children are taught to "read lips" and to communicate by means of oral speech. Regular teachers who have these children in their groups must learn not to grimace while talking to them, for a voluntary exaggeration of facial muscles makes lip reading more difficult. They must give them as much opportunity for practice as possible, be patient, and yet not let them use their handicap as an excuse for not doing tasks which they should perform.

Hearing aids bring many closer to, or above, the threshold of normal hearing. But the development of the oscillograph, which produces sound waves visually, holds out new opportunities to the deaf and hard of hearing. The wavy lines produced by normal speech, which can be projected on a small screen, are sufficiently constant for the different speech sounds, so that it is possible to learn to read them. Radio and telephone connections with the apparatus may still further reduce the psychological void in which the deaf have been sentenced to live.

Testing for Auditory Defects. An ear specialist should be consulted for examination when a defect is suspected. He will probably use an electrical apparatus known as an audiometer, which produces sounds of varied intensity and pitch to obtain an accurate measure of the extent and range of the defect. For preliminary routine examinations the whispering test or the watch test may be used. If a moderately loud whisper can be heard at 20 feet with each ear when one is turned toward the source of sound and the other covered, hearing is probably normal. If

not, the testee moves to 15, 10, or 5 feet if necessary. Acuity is recorded as 20/20, 15/20, 10/20, or 5/20, respectively. If he cannot hear when words are whispered directly into his ear, the record is ?/20. The watch test employs the ticking of a watch in the same way. A few cases need to be tried to establish a norm since the intensity of the ticking of different watches varies.

Speech Defects. Speech disorders, ranging from mild to severe, are variously reported as occurring in from 2 to 3 per cent of the school population. In most of these cases, expert treatment and training will effectively reduce or eliminate the difficulty. The most stubborn, however, is stuttering, sometimes called stammering, though the latter is a more general and less definite term. Stuttering is the unnecessary repetition of a letter, word, or phrase. Sometimes speech is inhibited in the process, and the sufferer is led to invent more or less satisfactory circumlocutions, or perhaps to avoid people because of sensitiveness over his defect. There are many theories as to the causes of stuttering, though there is general agreement that the difficulty is central or cortical and not in the speech mechanism itself. One is a theory of auditory amnesia involving weakness of auditory images and the supply of blood to the brain. Another, the Freudian theory, connects it with anxiety-neurosis and anxiety-hysteria. An attenuated Freudian theory holds that it is the hangover of the inhibition with respect to obscene words used furtively by small boys. The promised cures are more varied, even, than the theories, and most of them, especially those given with the most assurance and involving a fee, are useless.

A number of conditions tend to bring on stuttering, such, for example, as shock or fright, nervousness, language conflicts, and hearing stutterers. A relationship to handedness has also been suggested, though left-handed children who are stutterers may have emotional experiences in their history which also could predispose them to stuttering. Forcing left-handed children to write with the right hand has in some cases been followed by stuttering. Though this is by no means a rule, best practice now favors permitting children to write with the preferred hand.

Minor speech disorders are numerous. They have been listed as follows: lisping, baby talk, sound substitutions, and omissions due to carelessness, hoarseness and harshness, nasality, lalling or muscular sluggishness and laziness in pronunciation, foreign accent, and falsetto. Most of these disorders can be corrected with proper training. The emphasis on the speech defects of pupils should not obscure the fact that the speech of teachers is sometimes so defective as to interfere with the

effectiveness of their work and impose a nervous strain on the pupils who have to listen to them. Hence speech training and correction, when needed, should be a part of teacher preparation.

Other Handicaps. Some other forms of physical handicap make adjustment difficult or require special treatment. Among these are infections, including tuberculosis, orthopedic defects, and what may be called nervous disorders. Whatever the disorder, it demands three things of the school: (1) that the difficulty be discovered, (2) that adequate medical treatment be facilitated by appropriate means, and (3) that the school program and treatment of the child take the handicap into account. The program should be carried forward in such a way that the pupil is not embarrassed unnecessarily, that he is not called upon to do what his handicap does not permit, thus rousing the undesirable consequences of frustration, and that his school life be as normal and as much like that of other children as possible.

3. HEREDITY

Empirical Principles. Every teacher knows that pupils who do not improve in school are handicapped by defective heredity! In spite of this convenient rationalization for faulty educational procedures, the capacity for development, be it little or great, is determined by the genes, the tiny "factors" in the forty-eight chromosomes which every person receives from his parents. True, the possibilities for development are not always realized, and are often masked by social custom. But it is the function of the school to bring them out. Unfortunately, much that we would like to know about heredity has not yet been discovered, the nature of the transmission of such a complex trait as intelligence, for example. But much is known, and, unfortunately, much that people think they know isn't so.

Most rapid in recent years has been the increase in our knowledge of the mechanism by which characteristics of parents are transferred to their offspring, though the basic principles were recognized long before the development of a science of biology or of genetics. The most fundamental general principle of heredity is that *like begets like*. True, bizarre exceptions have occurred, if we are to believe our mythology, and monsters are occasionally born; but the bear does not give birth to monkeys, nor do men gather grapes of thorns nor figs of thistles. Yet within the species there are differences: Bear cubs are not all exactly alike, nor are all grapes and all figs. Children in the same family differ markedly from each other. Such observations as these give rise to the second basic empirical principle of heredity, *variations occur*.

The reasons for these variations have been sought far and wide. They were once accounted for on the basis of the influence of experiences which change an individual and hence his descendants through heredity; but evidence for the inheritance of acquired characteristics is lacking. Explanations have been sought on an atavistic basis, a throw-back to some earlier or more primitive ancestry, while Darwin considered that variations, through the process of natural selection, are responsible for the origin of species and the course of evolution. A great deal of light was thrown on this question of variation within the species by the work of Gregor Mendel (1822–1884).

Mendel's Laws. Mendel was a monk and later the Abbot of Königskloster, an Augustinian monastery in Brünn, in Austria; and his now famous experiences with garden peas, lasting over a period of eight years, were summarized in a paper which virtually gave the start to the science of genetics, and which was first published in the *Proceedings* of the Natural History Society of Brünn in 1866. But it did not come to the attention of the scientific world until 1900, thirty-four years later.

The regularity of inheritance which Mendel observed he formulated as two laws, the law of segregation and the law of independent assortment.[5] The *law of segregation* may be illustrated by one of his own experiments. In this experiment he used two varieties of peas, those growing on tall vines measuring six or seven feet in height, and those growing on short vines only about nine to eighteen inches high. He cross-fertilized these two contrasting varieties, after first removing the stamens so that they would not self-fertilize, by placing the pollen of one carefully upon the stigma of the other.

In the diagram (Figure 11) illustrating what happened in the succeeding generations, the long line stands for the tall variety and the short line for the short.

He found that the hybrids thus obtained (F_1) were all tall; but when they were allowed to self-fertilize, they produced in the second filial generation (F_2) three tall plants to one short one. In the next generation (F_3), the short vines all produced short vines, thus breeding true, and a third of the tall ones produced all tall vines, also breeding true; but the other two-thirds of the tall vines produced long and short varieties in the same ratio that the hybrids had, namely, 3:1. Thus, for this generation the ratio is one true tall to two hybrids, to one true short; or 1:2:1.

The tall hybrid varieties thus were demonstrated to contain factors producing both tallness and shortness in definite proportions; and, since

[5] T. H. Morgan, *The Physical Basis of Heredity*, Philadelphia: J. B. Lippincott Company, 1919, p. 24.

in this case the tall is more powerful, tallness is said to be a *dominant* trait, while shortness is *recessive*. The pollen grains and the ovules apparently combine in the following possible chance relationships: tall-tall, tall-short, short-tall, and short-short. This separation or segregation of the different kinds produces the results found and gives the name to the law of segregation.
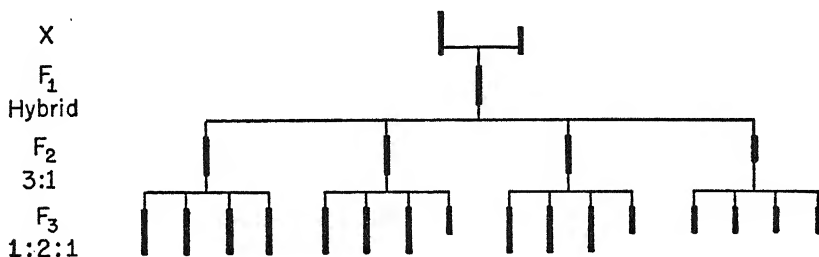
Figure 11. The "Family Tree." This is the result of crossing tall and short varieties of peas. Tallness is dominant and is indicated by the longer lines.

Mendel's greatness is shown not only in this formulation of his discovery of the 3:1 ratio as the law of the appearance of dominant and recessive traits, but no less in his careful arrangement of his experiments using contrasting characteristic differences. And like the true man of science that he was, he amassed sufficient data to support his conclusions.

Mendel's second law, that of *independent assortment*, applies this 3:1 ratio of F_2 to pairs of characters, showing that the same principle holds for the separate characters, which vary independently of each other.

If tall peas with colored flowers are crossed with short peas with white flowers, ideally, according to the 3:1 ratio, there would be twelve tall and four short, and twelve colored (dominant) and four white. Of the twelve tall, nine would be colored and three white; and of the four short, three would be colored and one white, making the ratio 9:3:3:1.

The law or principle of heredity known as *linkage* provides an exception to Mendel's second law, that of independent assortment. And it is of particular interest in the case of so-called *sex-linked* characters, which are constantly being discovered, and which are due to the fact that such genes are a part of, or are carried by, the sex chromosome itself. In man, red-green color blindness is a sex-linked character, being found on the average in half the sons of a normal daughter whose mother was normal

and whose father was color-blind. It is probable that other characters not so easily isolated are also more or less regularly sex-linked.

Prenatal Influences. Among ignorant people, the belief is common that the experiences of the pregnant mother exert a striking influence upon the unborn child. One mother bumped her face on a ham hanging in the dark cellar, and as a result, as she believed, her child had a birthmark on her face which was just the shape of a ham. A Negro laundress prided herself on her ability in ironing shirts which she explained was due to the fact that before she was born her mother used to sit and talk with the best shirt-ironer in the neighborhood while she worked.

Such yarns as these are old wives' tales—mere fabrication or coincidence. But the play of environment begins where the influence of heredity ceases, namely, with the fertilized egg. The full potentialities are already there; how they will develop is the next question. At its two-cell stage or later, the parts may separate and form two separate individuals, which is probably what happens in the case of similar or "identical" twins, or they may only partly separate, forming Siamese twins or two headed monsters, etc., a condition which may be produced in the frog embryo merely by turning the eggs upside down at this stage.

In the blastula stage, the cells of some of the lower animals have been experimentally moved about, which sometimes makes no difference in the development of the animal. The cells that would have grown into skin readily become bones because they are placed among the cells that are to develop into bones. The environment of each cell consists in part, therefore, of the near-by cells. A little later, after they have become more differentiated, by careful transplanting, a leg or almost any body part may be made to grow from any other part of the body. In some of the lower life forms, changes in temperature, etc., which displaced the cellular pattern have caused the animal to turn inside out, while fish with one median eye like the mythical Cyclops have been produced by treatment with magnesium solutions.

But as a rule, the human embryo—or *fetus*, as it is called after the first month or six weeks of gestation—lives in a well-protected environment little subject to the influences which play upon the life of the mother except those acting through the blood stream through which it receives its oxygen and nourishment. Hence there are comparatively few conditions which have any effect, and these are largely physiological in nature, for example, malnutrition, prolonged and wasting disease, certain infections such as those of venereal disease, some occupational poisons

like lead or phosphorus, over dosage of anesthetic drugs, and of course, occasionally, birth injuries.

Early Studies of Heredity and Environment. Sir Francis Galton attacked the related problems of heredity and environment by a different method from that of Darwin—the observational and statistical. Collecting data on such traits as stature, eye color, high intelligence, eminence, and artistic ability, he formulated two laws. One of these, the law of *ancestral inheritance,* states that on the average "the two parents contribute between them one-half of each inherited faculty, each of them contributing one-quarter of it. The four grandparents contribute between them one-quarter, or each of them one-sixteenth, and so on." The second law is that of *filial regression:* for example, "The stature of adult offspring must on the whole be more mediocre than the stature of their parents, that is to say, more near to the mean or mid of the general population." These formulations share the strength and weakness of all statistical studies. They hold fairly well for averages but are not necessarily true of individual cases.

Galton likewise sought evidence concerning the extent to which eminence is due to hereditary and environmental factors.[6] He selected the most outstanding man per 4000 population and then investigated the relationships of 977 such eminent men. He found that, all told, they had 525 relatives as eminent as themselves; whereas 977 men selected at random have but four. Galton contended that many of the eminent had risen "through all obstacles caused by inferiority of social rank," while many who "are largely aided by social advantages are unable to achieve eminence." While this is undoubtedly true, it is probably also true that many who did not achieve eminence might have done so if they had had the opportunity to obtain a better education.

Several famous and infamous families have been studied, some of which should probably be reported briefly. The so-called Jukes family was made famous in a kind of sociological report which set the style for several subsequent investigations.[7] Later it was estimated that this degenerate family had cost the taxpayers of their various communities upwards of $2,516,685 for support in jails, penitentiaries, and institutions for the feebleminded.[8] In sharp contrast with the Jukeses is the Edwards family, in which a second marriage furnished something approaching

[6] Sir Francis Galton, *Hereditary Genius: An Inquiry into Its Laws and Consequences,* London: Macmillan, 1869; New York: Macmillan, 1914.

[7] R. L. Dugdale, *The Jukes,* New York: Putnam, 1877. (4th ed., 1910.)

[8] A. H. Estabrook, *The Jukes in 1915,* Washington: Carnegie Institution, 1916.

experimental control.[9] Richard, the grandfather of Jonathan Edwards, the celebrated New England divine, married the brilliant and beautiful Elizabeth Tuttle, whom he later divorced "on the ground of her adultery and other immoralities," and later married Mary Talcott, of average ability and attractiveness. From the second marriage, though there were five sons and a daughter in the first generation, none of the descendants raised their heads above mediocrity, while from the first came Jonathan himself and a whole galaxy of famous people including fourteen college presidents and more than one hundred college professors.

Another double union tells a similar but sadder story.[10] A young soldier of the American Revolution, whom the investigator called Martin Kallikak, a name derived from two Greek words meaning good and bad, had an illegitimate son by a feebleminded woman; after the war, Martin returned home and married a woman of his own status. None of the descendants from his marriage rose to any great eminence, apparently, but all were respectable citizens except for an occasional slip, two being reported as alcoholics, one as sexually immoral, and one a case of religious mania. But from the first union, of the 480 descendants, 187 of whom have been traced, there were 143 feebleminded, 36 illegitimates, 33 prostitutes, 24 alcoholics, 8 keepers of brothels, 3 epileptics, and 46 reported normal.

Of course, the anti-hereditarians point out that Elizabeth Tuttle, the mother of so many college presidents and professors, would probably have been sterilized by the enthusiastic eugenicist, and that the environment of the first line of Kallikaks and of the Jukes family was hardly one which the society that permitted it could expect would promote the development of an honest and God-fearing citizenry. More recent studies, as have been shown, emphasize the importance of environmental factors, the influence of social class and of blighted areas, for example, in producing good and bad citizens.

Twin Resemblances. Another kind of statistical attack upon the problem of heredity seeks to compare various characteristics of individuals for a certain trait by correlating them with those of their siblings (brothers and sisters). For the population at large, correlations[11] between random samplings have been found to be around .00, but for brothers

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[9] A. E. Winship, *Heredity; Revision of Jukes-Edwards: A Study in Heredity and Environment,* Harrisburg: Meyers, 1900.

[10] H. H. Goddard, *The Kallikak Family,* New York: Macmillan, 1912.

[11] The coefficient of correlation is a figure between -1.00 and $+1.00$ which represents the degree of relationship between variables. A correlation around .00 is a purely chance relationship, .50 may be considered substantial, and .80 to .90 high.

and sisters the correlations are .50 or higher for such characteristics as hair and eye color, cephalic index, and height. The same has been found to be true, but with greater variations, for scores on various tests of mental and school abilities. Galton studied thirty-five pairs of identical (monozygotic) twins and twenty pairs of fraternal (dizygotic) twins.[12] The former, more properly called similar, for they are not identical, are of the same sex and have probably come originally from the same ovum; the latter, dissimilar or fraternal twins, from separate fertilizations of different ova. In the case of similar twins, the heredity would be held constant. From the reports which Galton received, he concluded that however different their nurture, the similar twins remain alike; and, though the experiences of the fraternal twins are practically the same, their differences of nature continue.

In recent years studies have been made of pairs of similar twins on the assumption that any differences found would be the consequence of environmental influences. A number of problems present themselves in this work, however: such pairs are hard to find, determination of true monozygotes is difficult, complete case records are not available, and conditions that make for differences found are often not known. One study was made of nineteen pairs of similar twins and fifty-two pairs of fraternal twins reared together.[13] The results show that, after a period of separation, physical traits of monozygotes remain the most alike, ability and achievement vary somewhat, and personality characteristics vary the most. In general, the similar twins reared apart did not differ more widely than the fraternal twins reared together. In spite of some extreme differences in environment, striking similarities were found in intelligence, abilities, and even in disease history. Yet some IQ's[14] varied as much as 15 or 20 points, where a difference in schooling and cultural stimulation was most marked.

Multiple births, even though the offspring are reared together, provide an opportunity for investigations into the nature of the hereditary processes, as in the case of the Dionne quintuplets.[15] Studies using the so-called method of *co-twin control,* by means of which one of a pair

[12] Sir Francis Galton, *Inquiries into Human Faculty and Its Development,* London: Macmillan, 1883; New York: Dutton, Everyman's Library, 1908.

[13] H. H. Newman, F. N. Freeman, and K. J. Holzinger, *Twins: A Study of Heredity and Environment,* Chicago: University of Chicago Press, 1937.

[14] The IQ (intelligence quotient) is the ratio of the mental age, as obtained from a test, to the chronological age. A child with an IQ between 90–110 is regarded as normal, below 70 as feebleminded. (See Chapter VIII.)

[15] W. E. Blatz and others, *Collected Studies on the Dionne Quintuplets,* Toronto: University of Toronto, 1937; and H. H. Newman, *Multiple Human Births,* New York: Doubleday, Doran, 1940.

of twins is given certain training and the other is not, both being tested later, emphasize the importance of developmental factors. Correlation coefficients between measurements on test scores have revealed such differences as are shown in Table 2.

TABLE 2 *Resemblances of Similar and Dissimilar Twins*

TRAITS	DISSIMILAR TWINS	SIMILAR TWINS
Physical	.60	.95
Intelligence	.55	.85
Mechanical ability	.28	.69
Motor skills	.43	.79
Vocational interests	.28	.50
Personality	.27	.57

When it is realized that in both groups the children of each pair are the same age and have been reared in the same family, the consistently higher correlation in the several traits for the identical twins reveals the significance of the hereditary factors.

Environmental Influences. Children have been studied in foster homes, where a comparison can be made between the effect on children's performance of their own and their adopted homes. The changes in the intelligence of foster children seem "to indicate that an improvement in environment produces a gain in intelligence."[16] Siblings, when they had been sent to different foster homes before the age of six, showed a correlation of .25; and when the foster homes were of different grade, of .19; while unrelated children who had been sent to the same foster homes showed a correlation ranging from .25 to .37.

The force of these conclusions emphasizing the influence of environment on mental ability is somewhat weakened by a similar investigation under the direction of Terman, which concluded that, since the IQ's of about 70 per cent of school children will not be altered more than 6 to 9 points by changed environment and probably as few as two in a thousand will be altered as much as 20 points by the most extreme contrasts of home environment, heredity is by far the more important factor.[17] Both studies agreed that the changes in the foster homes raised

[16] National Society for the Study of Education, *Nature and Nurture: Their Influence upon Intelligence (Twenty-seventh Yearbook)*, Bloomington: Public School Publishing Co., 1928, Part I, Chapter IX.

[17] *Ibid.*, Chapter X.

the IQ's on the average 5 or 10 points. More recent studies made at the University of Iowa also concluded that an enriched environment tends to raise the intelligence scores of children, while the impoverished environment of a meagerly equipped orphanage has the opposite effect.[18] Reports on the influence of the nursery school on intelligence are equivocal. The unreliability of intelligence tests for the preschool years, as well as certain problems of selection and the handling of data, make their interpretation difficult.

As the evidence piles up, however, the truth of the old adage to the effect that you cannot make a silk purse out of a sow's ear becomes better and better substantiated. From a letter of Galton's, written the day before he was five, we know that he could then read and write, add and multiply by single-place numbers, repeat fifty-two lines of Latin poetry, read a little French and tell time. The differences between such a child and the feebleminded in our institutions or even the common run of children in our nursery schools are too great to be accounted for on the basis of a pleasant home, books lying around, and parental encouragement. It may be true, as Cattell has shown, that a larger number of eminent men per one thousand population have come from New England than from other states, and this may be because there are more educational opportunities there; or it may be because the children of the eminent men who maintained the institutions of learning were born there.

Cautions in Interpretation. In considering the importance of heredity and environment there are two major errors to avoid. The first is the error of viewing them as two separate things which permit a comparison to be made of the force exerted by each. They are not forces at all, but the names for certain aspects of the growth process—heredity, the assortment of genes and chromosomes in the ovum and sperm; environment, the surrounding media, mechanical, thermal, chemical, social, etc., which, like food, become a part of the growing organism, and, like heat or chemicals, induce changes in the cellular organism, or, like people and words, condition various overt responses. Without the cells, environment would be nothing; without environment, the cells could not exist. If the term environment is limited to mean the external factors conditioning the responses of the individual from birth on, the situation is not altered: both are absolutely essential. Hence statements to the effect that the influence of heredity to that of environment is as 40 to 60 or as

[18] National Society for the Study of Education, *Intelligence: Its Nature and Nurture*, Part II, Original Studies and Experiments (*Thirty-ninth Yearbook*), Bloomington: Public School Publishing Co., 1940.

90 is to 10, etc., mean little. Both are everything; each one is nothing. It is like inquiring into the relative importance of eggs and heat in making an omelet, or the seed and the soil in growing grain, or the negative and the developing process in preparing a photograph. However, the differences between individuals may be due primarily to one or the other factor, just as the same negative may produce a good or a poor print, and a poor print may be the best that can be made from a poor negative.

The second error is that of viewing heredity fatalistically, as if it alone could determine just what a person will become, and there is nothing to be done about it. True, it does set fairly definite limits to development, but within those limits there is opportunity for a wide range of variation in accomplishment. Hence, even though one is ever so doughty a hereditarian, there is a great task for education to perform: on the one hand, to provide the best kind of environment so that each individual may develop to his fullest capacity; on the other, to provide such differential training as will most adequately fit the individuals of varying abilities to the different tasks they can do and that need to be done.

4. Growth and Development

"Stages" of Growth. In the process of growing up, a child seems to pass through various stages, and it is customary to explain, or minimize, certain physical or conduct peculiarities by saying, "Oh, it's just a stage: he'll get over it." This is undoubtedly true with respect to many diverse things such as negativism, solitary play, "whining," rapid growth, and pimples. But when it comes to deciding the age at which any stage begins and when it ends for young people generally, or even for one person, the vagueness of the terms becomes at once apparent. Sometimes the effort is made to assign particular ages when the changes being described appear, or to group them in the manner of Shakespeare with his seven ages of man, or of Hall with his recapitulation of ancestral history. While each ensuing stage appears gradually, there are marked differences at more widely separated points.

In assigning ages to developmental periods, some writers show a fondness for multiples of four (4, 8, 12, 16, 20), others for multiples of five or six, while still others employ irregular intervals. It is usually recognized that the value of any such classification lies in its convenience with respect to the purposes it is intended to serve. From the educational point of view, the six-year interval is probably as satisfactory as any. The time from birth to six years of age may be called the period of infancy and early childhood, though if the child attends nursery school and kindergarten the age of six is not the critical point that it is

when it marks the transfer from the home to the wider school environment. The years from six to twelve, corresponding to the six grades of the elementary school, may be called the period of childhood, and from twelve to eighteen, corresponding to the six years of junior and senior school, the period of adolescence.

Infancy and Early Childhood (1–6 years). The growth process is infinitely complex, and its phases are closely interrelated to environmental factors. In an earlier chapter, the progress of motivation and activity was briefly traced through the fetal period and carried through the early childhood years for postural behavior and locomotion. Here, by means of Table 3, the postnatal motor behavior can be compared with other developmental sequences. The items that are listed are test situations selected from the large number used as being most typical of the respective developmental ages. The rich literature in the field of growth for this period is here passed over since our chief interest is in the school period.

During these years the child changes from a physiologically functioning but helpless organism to a remarkably competent and distinctive personality. Whether or not the last year or two has been spent at home or partly under the influence of the nursery school and kindergarten environment, his finer motor adjustments are probably about ready for the demands of the written language. He will continue to develop socially, but he must learn to read and write if he is to adapt satisfactorily to the modern culture. And so he goes to school.

Childhood (6–12 years). The social transitions a child must make are much more abrupt than the physiological changes which in large measure determine them. The gradual acceleration of growth, as shown by the curves in the latter part of this chapter, continues through the childhood period and tapers off in adolescence. In the elementary school, the child is expected to acquire the "tools of learning." This is a convenient expression that applies primarily to the verbal and numerical symbols by means of which various kinds of behavior are represented—sensing, perceiving, remembering, and thinking. But normally one continues to acquire and refine the "tools of thought" for many years as a new word or concept is acquired, or a new frame of reference, to meet new situations.

On the other hand, the emphasis on the verbal and numerical heritage has tended to become an overemphasis, to the neglect of physiological factors and the social and esthetic needs of the child. The consequence has been too much maladjustment in later years. The norm of school

TABLE 3 *Developmental Sequences for Motor, Adaptive, Language, and Personal-Social Behavior up to Five Years of Age*[19]

LEVELS OF MATURITY	MOTOR BEHAVIOR	ADAPTIVE BEHAVIOR	LANGUAGE BEHAVIOR	PERSONAL-SOCIAL BEHAVIOR
5 years	Skips on alternate feet.	Counts 10 pennies.	Speaks without infantile articulation. Asks "Why?"	Dresses without assistance. Asks meanings of words.
4 years	Skips on one foot.	Builds gate of 5 cubes. Draws "man."	Uses conjunctions. Understands prepositions.	Can wash and dry face. Goes on errands. Plays cooperatively.
3 years	Stands on one foot. Builds tower of 10 cubes.	Builds bridge of 3 cubes. Imitates cross.	Talks in sentences. Answers simple questions.	Uses spoon well. Puts on shoes. Takes turns.
2 years	Runs. Builds tower of 6 cubes.	Builds tower with 6 cubes. Imitates circular stroke.	Uses phrases. Understands simple directions.	Verbalizes toilet needs. Plays with dolls.
18 mos.	Walks without falling. Seats self. Tower of 3 cubes.	Dumps pellet from bottle. Imitates crayon strokes.	Jargon. Names pictures.	Uses spoon with moderate spilling. Toilet regulated.
12 mos.	Walks with help. Cruises. Prehends pellet with precision.	Releases cube in cup.	Says 2 or more words.	Cooperates in dressing. Gives toy. Finger feeds.
40 weeks	Sits alone. Creeps. Pulls to feet. Crude prehensory release.	Combines 2 cubes.	Says one word. Heeds his name.	Plays simple nursery games. Feeds self cracker.
28 weeks	Sits, leaning forward on hands. Grasps cube. Rakes pellet.	Transfers cube from hand to hand.	Crows. Vocalizes eagerness. Listens to own vocalizations.	Plays with feet and toys. Expectant in feeding situations.
16 weeks	Head steady. Symmetrical postures. Hands open.	Competent eye-following. Regards rattle in hand.	Coos. Laughs. Vocalizes socially.	Plays with hands and dress. Recognizes bottle. Poises mouth for food.
4 weeks	Head sags. Tonic neck reflex. Hands fisted.	Stares at surroundings. Restricted eye-following.	Small throaty sounds. Heeds bell.	Regards faces.

[19] Tabulated from A. L. Gesell and C. S. Amatruda, *Developmental Diagnosis*, New York: Hoeber, 1947 (second edition). From Figs. 2–5, pp. 11–14. By permission.

achievement, defined as average performance, in some cases has been understood in its other sense, that of a goal to be striven for. Children have therefore been forced, though unsuccessfully, to try what was for them impossible, while others have done less than they might have done because with little effort they could keep above the average. The longitudinal studies of the growth of individual children have shown that the average growth is not normal for most children. If their health is good and their environment satisfactory, their own rate of growth is what is normal, and the task of the school is to adjust its program to their changing needs. In other words, it cannot be truly said that a child "ought" to do better solely because some other children do better. His improvement can rightfully be expected only in terms of his maturing. The present tendency is to correct the overemphasis on the "tools of learning" (though they must, of course, still be emphasized), and make the elementary school a place where each child will continue his optimum development physiologically and socially as well as mentally.

Adolescence (12–18 years). Adolescence begins with puberty, the time of appearance of pubic hair, when the individual is capable of producing young. In the male, it is the time of first appearance of spermatozoa, discovered clinically by urinalysis, or more generally with the first nocturnal emissions. While in the majority of cases the onset of puberty occurs in the thirteenth and fourteenth years, spermatozoa have been found in the morning urine of boys as young as twelve and eleven years in whom there have developed none of the secondary sex characteristics such as voice change and the appearance of pubic hair. In the female, the appearance of the first menstruation, the menarche, is usually considered as marking the beginning of adolescence. Yet the distribution of menarcheal ages has been found to range from nine to twenty, with the modal point according to different studies in the thirteenth, fourteenth, and fifteenth years.

These variations are perfectly natural and signify only that there are differences in the rate of growth and glandular development of different individuals. The worries of high-school boys and girls about their not being normal can often be set at rest if they know that variation from the average does not mean that they are "abnormal." It is clear, therefore, that although a definite physiological change marks the onset of adolescence, the children who enter the seventh grade, the first year of the intermediate or junior high school, are at various stages of physiological development. But each is developing at his own rate toward maturity.

The adolescent was spoken of earlier as a marginal man, in process of social locomotion from the childhood group he is outgrowing to the adult group to which he does not yet quite belong. The practice of ceremonially introducing the adolescent into the adult group, as practiced by some primitive tribes, has much to be said for it. Parents notoriously find it hard to realize that their little boy or girl is now grown up, and often, it must be admitted, they have much on their side of the argument. The schools show a parental solicitude about those who go on to college, but as a rule neglect those who do not. The task of adjusting the complexity of the environment to the maturing abilities of the adolescent is not an easy one for home or school.

The secondary school period is necessarily one of differentiation. The varying interests, abilities, and needs of the pupils, as well as the various demands of a complex culture, call for a wide variety of preparation. Educational choices must be made by those who are not always ready to make them. So guidance programs and psychological clinics are set up to aid in these choices as well as in matters of personal-social behavior. The college curriculum has a prestige value which may attract many who for one reason or another are not qualified to continue through the standard four-year curriculum. Since the first two years of college are in reality a continuation of the secondary school program, administrative adjustments have been made to take care of the load. Junior colleges, for example, struggle to maintain a program equivalent to the freshman and sophomore year in college on the one hand, and to provide a terminal program of general and vocational education on the other, one that is more in harmony with the needs of many of the students who attend. A 6-4-4 program has been set up in some places, and has much to recommend it: 6-year elementary school, 4-year junior high school, and 4-year senior high school. Continuous reorganization of the curriculum is necessary if the institution is to adapt adequately to the pupils' needs, as they come to be better understood, and to the demands of a changing society.

The progress of physical growth through the childhood and adolescent years is indicated in the curves which follow, while other changes will be discussed in later chapters.

5. PHYSICAL GROWTH

Height. If growth is viewed as the proliferation of cells, the most rapid growth takes place before birth. At the time of birth the infant is well on the road to physical maturity. Perhaps the most striking difference from the adult, apart from size, is in gross bodily proportions,

as shown in Figure 12, in which the drawings are represented on the scale of the height of the mature man.

The earlier methods of measurement of physical growth were *cross-sectional*. Large numbers of children of different ages were measured. Only comparatively recently have *longitudinal* studies been made—the measurement of the same group of children at successive ages. The Harvard growth study, reported in several issues of the monographs

2 mo. 3 mo. fetus Newborn 2 5 13 22 years
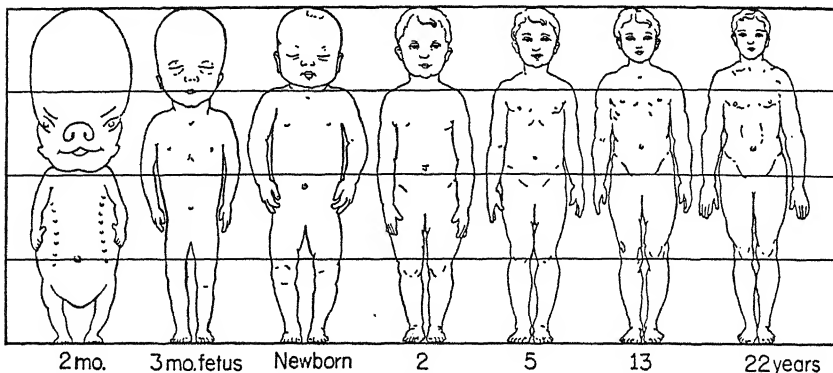
Figure 12. Outlines of the Body at Various Stages of Development. The figures show the changes in body form and proportions. (From *Morris' Human Anatomy*, edited by C. M. Jackson, 9th ed., Philadelphia: Blakiston, 1933, p. 25.)

of the Society for Research in Child Development, included many such longitudinal measures and is the most complete of any that have been made to date. Of the many records now available from this and other sources, the following will be briefly reported here: height and weight, head size, brain weight, dentition, carpal index, organic growth, and the development of behavior patterns. Table 4 gives the average height and weight of more than twenty thousand children under six years of age. It should be realized that these are cross-sectional norms and record only averages for the groups studied. They do not indicate how tall a child should be or what he should weigh.

The age of a child at the close of his year of most rapid growth in standing height is referred to as his *age of maximum growth* or *MG-age*. For girls the MG-age ranges from 10 to 14, with the greatest number of cases at 12 or 13. Figure 13 shows the average curves of growth in standing height for three groups of girls and three groups of boys as they grew from six to nineteen years of age. The midpoints of the MG-ages for each group are given below the chart.

TABLE 4 *Norms for Height and Weight for 21,442 Iowa Children from Two to Six Years*[20]

AGE IN MONTHS	10,802 BOYS		10,640 GIRLS	
	HEIGHT INCHES	WEIGHT POUNDS	HEIGHT INCHES	WEIGHT POUNDS
(2 years) 24–25	33.8	26.4	33.1	25.0
27–28	34.6	27.2	34.0	26.2
30–31	35.2	28.4	34.9	27.4
33–34	36.2	29.6	35.6	28.1
(3 years) 36–37	36.9	30.8	36.4	29.4
39–40	37.6	31.6	37.1	29.9
42–43	38.4	32.9	37.9	31.2
45–46	39.1	34.0	38.5	32.0
(4 years) 48–49	39.3	35.0	39.3	33.1
51–52	40.0	35.1	39.7	33.7
54–55	40.6	35.8	40.2	34.3
57–58	41.4	37.1	41.0	35.3
(5 years) 60–61	41.9	37.9	41.5	36.5
63–64	42.1	38.1	41.9	36.6
66–67	43.1	40.2	42.1	38.5
69–70	43.9	41.6	43.6	40.3

[20] Abbreviated from B. T. Baldwin and L. I. Stecher, *The Psychology of the Pre-school Child*, New York: Appleton, 1925, p. 34.

These curves reveal a number of interesting facts about growth: the shorter maximum height of girls, their earlier acceleration—about the twelfth year as compared with the fourteenth year for boys—and the overlapping of groups of slow- and fast-growing children. Note that Groups e and i—girls, and E and I—boys, attain their MG-age (indicated by small circles on the curves) at 12.5 and 14.5 years respectively. The growth of the groups to the left is more intense and rapid: during the four and a half years before and after the MG-age, the girls in Group a grew 13.46 centimeters more than those in Group i. The dot on each of the curves for the girls indicates the average menarcheal age, a comparison of which reveals a difference of 3.29 years between those groups; but with reference to the age at maximum growth, the difference is only .73 years.
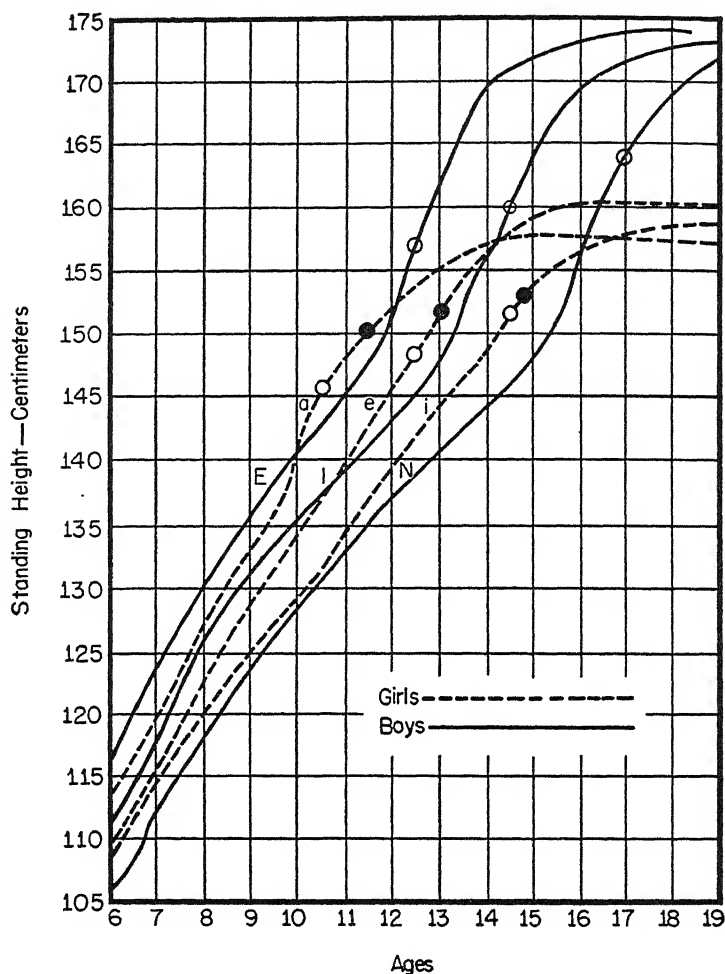
Figure 13. Growth Trends in Average Standing Height of Selected Groups of Girls and Boys Having Different Ages at Maximum Growth. The circles indicate MG-ages, the dots menarcheal ages. (Adapted from Fig. 8, p. 16, *The Physical and Mental Growth of Girls and Boys Age Six to Nineteen in Relation to Age at Maximum Growth*, by Frank K. Shuttleworth, *Monographs of the Society for Research in Child Development*, vol. 4, Serial No. 22, No. 3. Washington, D. C.: The Society, 1939.)
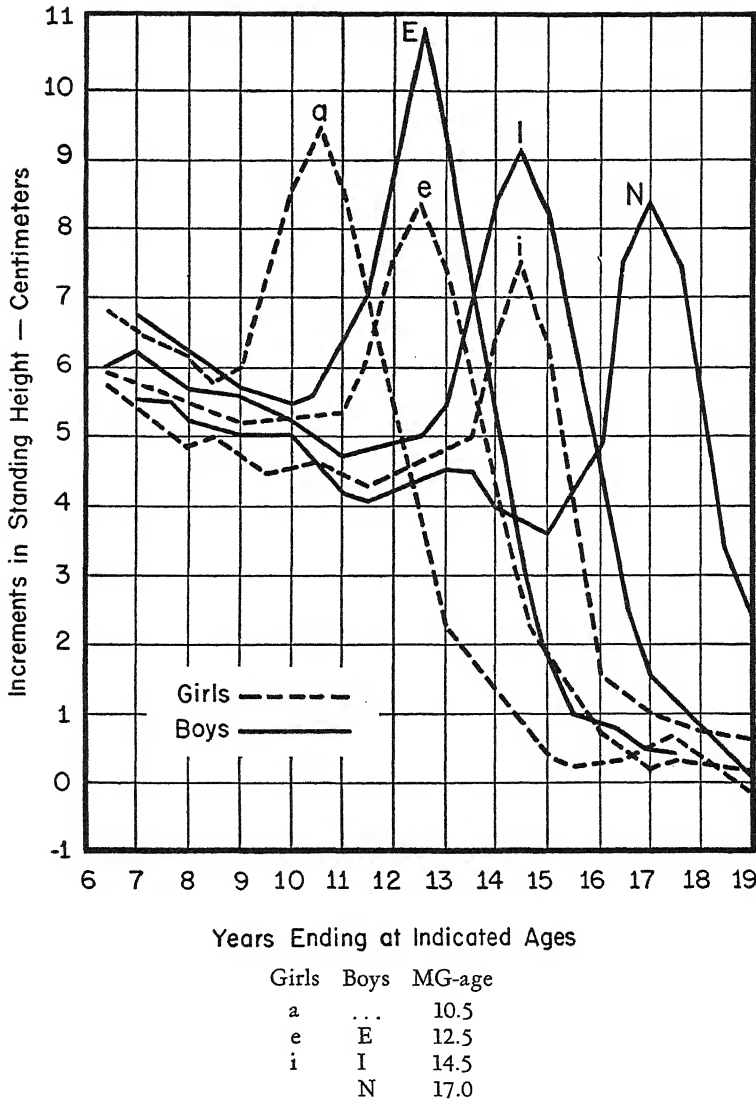
Figure 14. Average Annual Increments in Standing Height of Selected Groups of Girls and Boys. (Adapted from Shuttleworth, *op. cit.*, Fig. 14, p. 24.)

Figure 14 shows the curves of growth in standing height for the same six groups, plotted on an enlarged scale which is drawn to represent the successive annual growth increments. Thus Group a averaged 109.25

centimeters tall at age 5.5 and 116.05 centimeters at age 6.5. The difference is 6.8 centimeters, which is the annual increment for that year, and is plotted on Figure 14 as the start of the line for Group a. The other increments are plotted similarly. This figure reveals the consistently

Girls	Boys	MG-age
a	...	10.5
e	E	12.5
i	I	14.5
	N	17.0
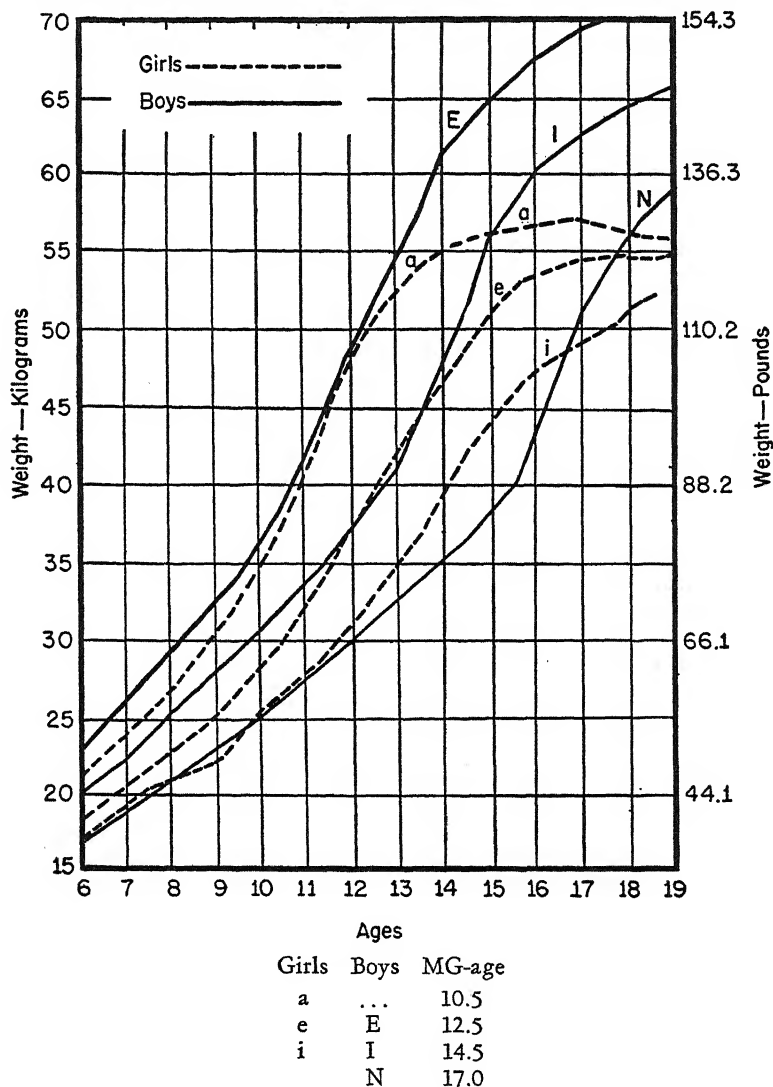
Figure 15. Growth Trends in Average Body Weight of Groups of Girls and Boys Having Different Ages at Maximum Growth. (Adapted from Shuttleworth, *op. cit.*, Figs. 111 and 112, pp. 149, 150.)

larger increments for boys, and the somewhat dramatic nature of the maximum growth age as a point of reference. There is clearly a characteristic pattern of growth in standing height, though the pattern is plastic, varying somewhat for different individuals and groups. Four factors, each complex in itself, account for any growth pattern: (1) the outward form in which growth is measured and expressed; (2) the com-
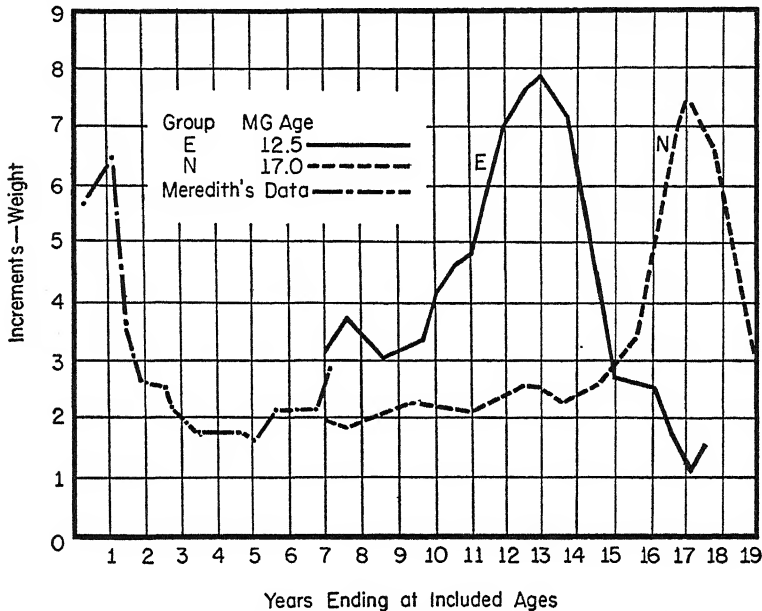
Figure 16. Average Annual Increments in Body Weight of Boys from Three Months to Nineteen Years. (Adapted from Shuttleworth, *op. cit.*, Figs. 114 and 120, pp. 152, 158.)

plicated endocrine events, chiefly related to the pituitary glands and gonads, developing new hormones which furnish the initial stimulus to accelerated growth; (3) the endocrine factors determining mature growth, which operate throughout the period so as not to distort the mature dimension; (4) sex differences.[21]

Weight. The weight curves are similar to those for height, though individual curves have greater fluctuations. Slow- and fast-growing groups are compared in Figure 15. These are the same groups whose standing height was recorded in Figure 13.

The annual increment in weight for the two groups of boys, E and N, with earliest and latest MG-ages are shown in Figure 16, and, on the

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[21] Shuttleworth, *op. cit.*, pp. 65–68.

same chart, data obtained from another study which show the early deceleration phase, followed by a period of relatively constant annual increment before the period of rapid acceleration begins. The fast-growing group, E, begins its acceleration much earlier than the slow-growing group, N.

Dentition. Another measure of the rate of physiological growth is the number of erupted permanent teeth. While the children with dif-
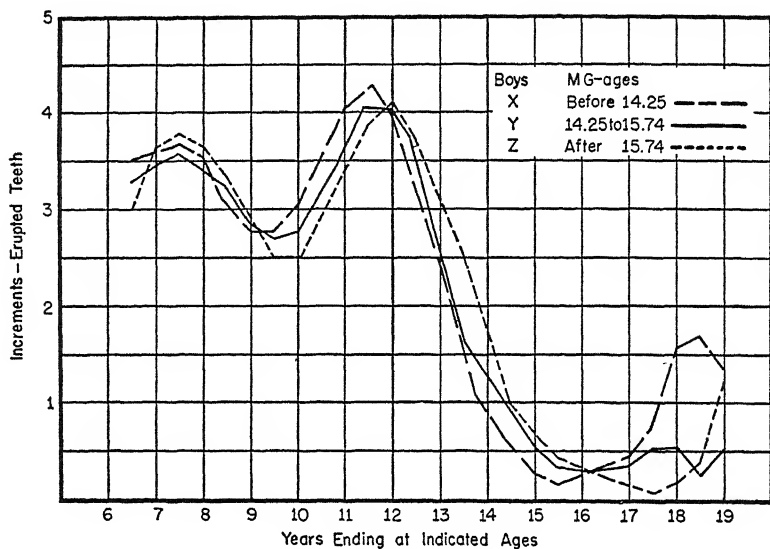
Figure 17.   Average Annual Increments in the Number of Erupted Permanent Teeth of Three Groups of Boys Classified According to MG-ages. (Shuttleworth, *op. cit.*, part of Fig. 128, p. 168.)

ferent MG-ages do not differ markedly in this respect, those whose most rapid growth occurs earlier show a slight precocity (Figure 17). The curves for girls are similar except that there is less difference between the three groups, and their growth is approximately one year ahead of that of the boys. The age at which children have a full quota of twenty-eight permanent teeth varies from nine to twenty, with the average at 13.9 for girls and 13.74 for boys. Such a wide variation suggests the value of their measure as an indicator of rate of growth in individual cases.

Cranial Growth. Measures of growth of the skull are made in four different ways: length, width, cephalic index, and cubic capacity. The

length and width are measured with calipers, an instrument like a pair of tongs. By the sixth year, cranial growth is relatively complete, as compared with height, weight, and dentition, yet continued growth tends to follow these same curves. Those with earlier MG-ages achieve their growth slightly earlier; and while the head size of boys is consistently larger than that of girls of the same age, they make the corresponding gains and attain their maximum later. There is a decreasing acceleration, quite marked in head width, less so in length until about the eleventh year for girls and the fourteenth year for boys, followed

TABLE 5	*Cubic Capacity of Brain of 10,000 Boys and Girls*[22]						
AGE	F	M (STATE SCHOOL)	M (PUBLIC SCHOOL)	AGE	F	M (STATE SCHOOL)	M (PUBLIC SCHOOL)
7	1193	1232	—	14	1298	1330	1357
8	1207	1253	—	15	1308	—	1377
9	1230	1265	1282	16	1326	—	1404
10	1239	1277	1304	17	1328	—	1415
11	1255	1289	1315	18	1328	—	1448
12	1263	1298	1323	19	1349	—	1466
13	1290	1310	1340	Adult	1351	—	1481

[22] R. J. A. Berry, *Brain and Mind*, New York: Macmillan, 1928. Reprinted by permission.

by a two-year spurt, and after that continued deceleration. The "resting phase" before the spurt is likewise found in group measures of estimated cranial capacity, as shown in Table 5 above. During the twelfth year the increment is but 0.6 per cent, but during the thirteenth and fourteenth years there is a 3.4-per-cent increase in the girls and a 2.2-percent increase in the boys.

Of particular interest and significance is the neural development, which, during these early years, is astonishingly rapid. At birth, the brain is already one-fourth of its adult weight, while most of the other organs, and the body as a whole, are only about one-tenth to one-fourteenth of what they will become. This lead is maintained during the first few years, so that the child's brain by the time he is five is approximately 90 per cent of its ultimate size, the increase being chiefly in the frontal lobes. Microscopic studies reveal the fact that the number of nerve cells is not only complete at birth but is not increased after

about the fourth month of fetal life, though the neuroblasts, as the un-
developed neurones are called, are still to fill out and put forth more
extensive fiber processes.

The *cephalic index* is the ratio obtained by dividing head breadth
by head length. Thus, if the breadth is greater in comparison with the
length, the ratio would be greater. Round heads would, therefore, have
a high cephalic index, long heads a low index. Figure 18 shows the
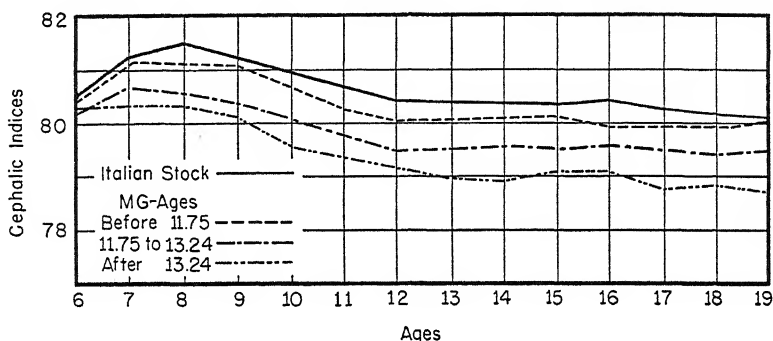
Figure 18. Cephalic Indices of Girls Classified by MG-age and Racial Stock.
(Adapted from Shuttleworth, *op. cit.*, Fig. 150, p. 195.)

gradual but slight decrease in the cephalic index of three groups of
girls with varying MG-ages. Different racial stocks show rather well-
defined variations in this dimension, as illustrated in Figure 18 by the
higher cephalic index of Italian girls. The curves for similar groups of
boys are similar.

Carpal Ossification. The stage of ossification of the wrist bones as
observed by means of the X-ray provides a somewhat inconvenient
though practical method of determining anatomical development (Figure
19). The carpal or wrist bones of the neonate do not stand out in an
X-ray photograph, for they are only gristle. But by the end of the first
year or sooner they begin to show up as dark shadows, more each year
in a fairly consistent order until the eighteenth or nineteenth, when
normally the ossification is complete. There are several ways of measur-
ing the amount of ossification that has taken place at any given time.
In many ways the most satisfactory is through the use of a series of
X-ray photographs of the hand and wrist showing the average amount
of ossification for each year of development.[23] This serves as a scale of
age standards with which the osseous development shown in the X-ray

[23] Flory, *op. cit.*, Figure 20.
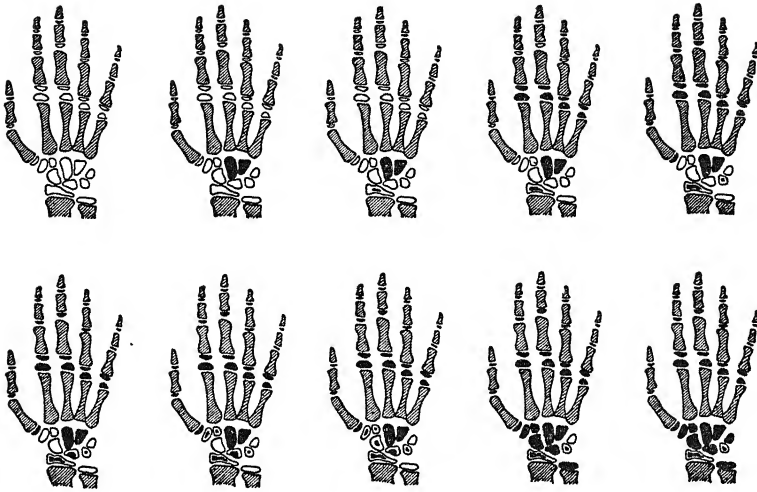
Figure 19. *Normal Progress in the Ossification of the Wrist Bones from Birth to Ten Years of Age.* (A. Schittenhelm (ed.), *Lehrbuch der Röntgendiagnostik*, Berlin: Springer, 1924, Fig. 23, p. 1168, "Die Röntgenuntersuchung bei Erkrankungen der endokrinen Drüsen," by M. Gürger and H. Schlecht.)

photograph of any given child may be compared, thus giving his carpal age. The similar osseous development of the bones of the finger joints (epiphyses) is also taken into account. In Figure 20 are presented curves of the rate of carpal growth of three girls, one of whom shows acceleration, one uniform average development, and one retardation. Note that the first passes the second during the eighth year.

Organic Growth. The curves of growth thus far described all tend to show a fairly consistent upward swing. Though there are periods of more rapid and less rapid development, there are no sharp deflections. This is not true, however, in the case of certain organs of the body, and particularly of some of the endocrine glands. Some of these trace a very different course. A schematic presentation is given in Figure 21. Note the early rapid acceleration of the neural type, the period of delay in the general and genital types, with the period of acceleration coming at about the same time as the rapid deceleration of the lymphoid type. These changes, it may be noted, occur during the prepubertal years, the years of most rapid growth, the MG-age.

Inferences from the Curves of Physical Growth. Certain conclusions of importance in education may be drawn from the longitudinal type

of data represented in this section. They tend to harmonize a number of otherwise discordant facts about growing children and properly lead to a better understanding of individual cases.
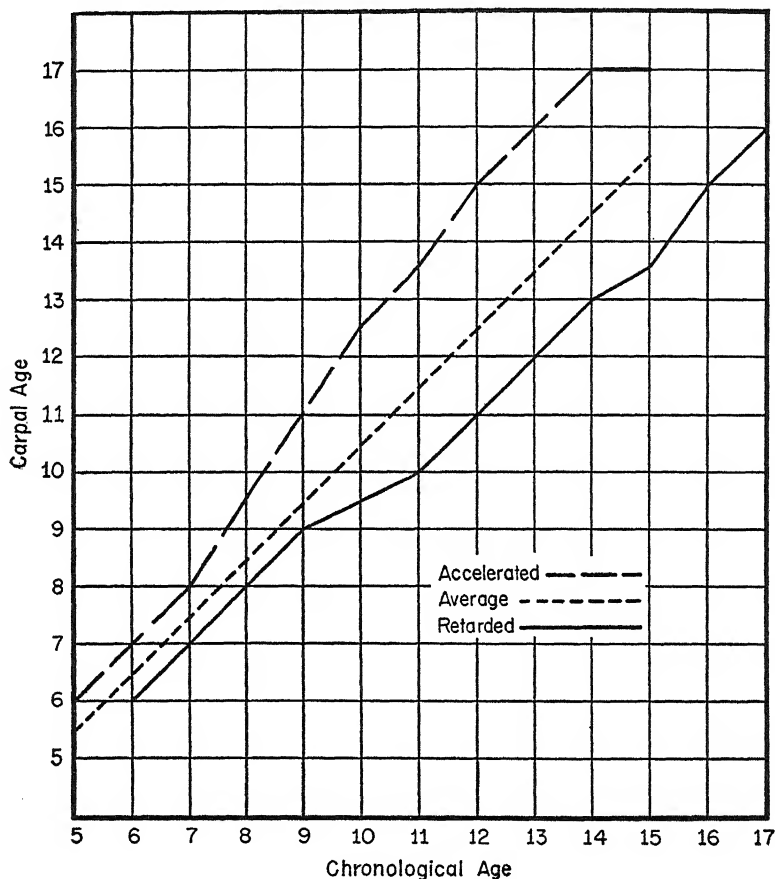
Figure 20. *Carpal Growth of Three Girls Showing Accelerated, Average, and Retarded Rates of Skeletal Development.* (C. D. Flory, *Osseous Development in the Hand as an Index of Skeletal Development* (*Monographs of the Society for Research in Child Development*, Vol. I, No. 3), Washington, D. C.: National Research Council, 1936. Figure 20 is drawn from Fig. 54, p. 109 and Fig. 58, p. 115. Reproduced by permission.)

1. Growth is a complex of simultaneous and related processes of such a nature that a series of measurements of one aspect is to a considerable degree an indicator of other aspects.

2. A series of consecutive measurements taken early in the life of one

The figure shows a graph with axes labeled PER CENT (vertical, 0 to 200) and AGE IN YEARS (horizontal, B, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20). Curve labels to the right:

Lymphoid type
Thymus, lymph-nodes.
Intestinal lymphoid masses.

Neural type
Brain and its parts, spinal
cord, optic apparatus, many
head dimensions.

General type
Body as a whole, external dimen-
sions (with exception of head and
neck), respiratory and digestive
organs, kidneys, aorta and pulmo-
nary trunks, spleen, musculature
as a whole, skeleton as a whole,
blood volume.

Genital type
Testis, ovary, uterine
tube, prostate, prostatic urethra,
seminal vesicles.

Figure 21. Major Types of Growth of the Various Parts and Organs of the Body.
The several curves are drawn to a common scale by computing their values
at successive ages in terms of their total postnatal increments to twenty
years. (J. A. Harris, C. M. Jackson, D. G. Paterson, and R. E. Scammon,
The Measurement of Man, Minneapolis: University of Minnesota Press, 1930.)

individual is a fair indicator of the progress of development of that
individual.

3. The growth of any one individual is unique, and is properly viewed
as deviating irregularly along its course from that of other individuals.

4. The growth of girls, particularly in the prepubescent and early
adolescent years, is more precocious than that of boys of the same
chronological age.

5. Growth is irregular among different body parts of the same indi-
vidual, which is observable quantitatively in a comparison of the seriatim
curves of one individual for height, weight, carpal index, and so on.
This phenomenon is quite familiar in certain of its more easily observ-
able aspects, as when bone growth gets ahead of muscle growth, pro-
ducing a period of temporary malcoordination, commonly called the
awkward age.

The Organism as a Whole. In the survey of physical growth which
has been given, it is clear that any one item, such as that of height, or
the rate of eruption of teeth, or the developing carpal age, is an abstrac-

tion. It does not actually appear by itself, but is, instead, merely one aspect of a complicated growth process. In a sense, a measure of any one
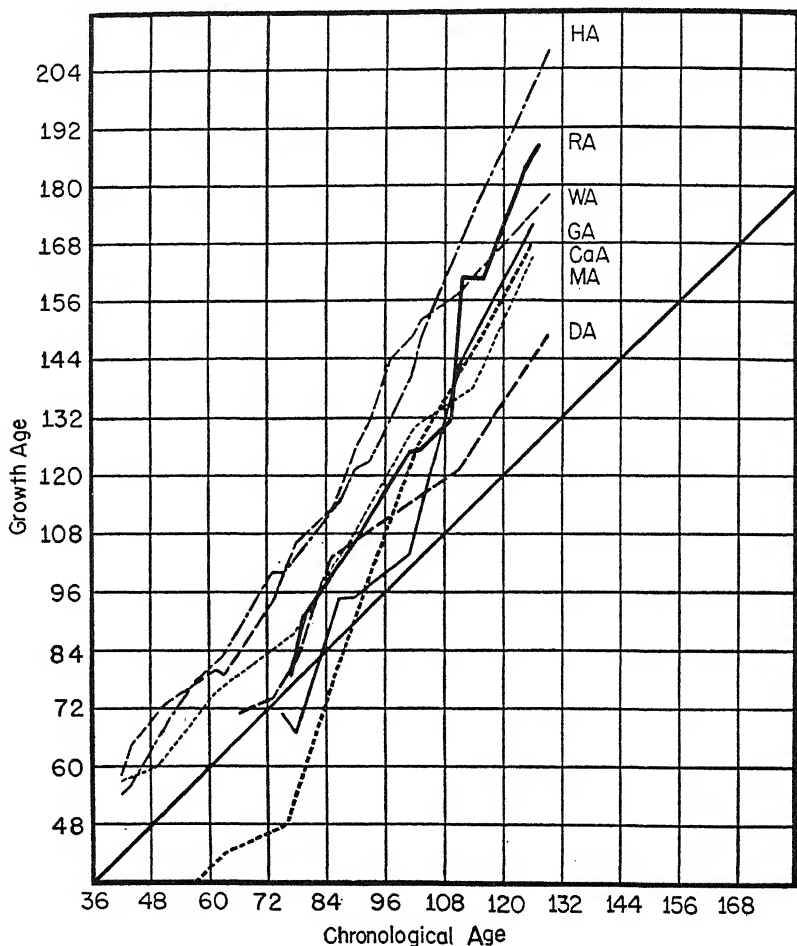
Figure 22.   *Growth Curves of a Fast-Growing Girl Recorded in Age Units.* (From growth charts of Willard C. Olson and Byron O. Hughes, by permission. These curves appear in R. G. Barker, J. S. Kounin, and H. F. Wright, *Child Behavior and Development*, New York: McGraw-Hill, 1943, pp. 200–201. Also see W. C. Olson, *Child Development*. Boston: D. C. Heath, 1949, Chapter VII.)

item would be an indicator of the development of all the others. Such a statement is only a hypothesis, however, and needs supporting evi-

dence if it is to be accepted. Should it turn out to be true, or even partially true, it would have important implications for educational theory and would necessarily result in rather important changes in practice. The way the hypothesis has been tested is by taking several such meas-
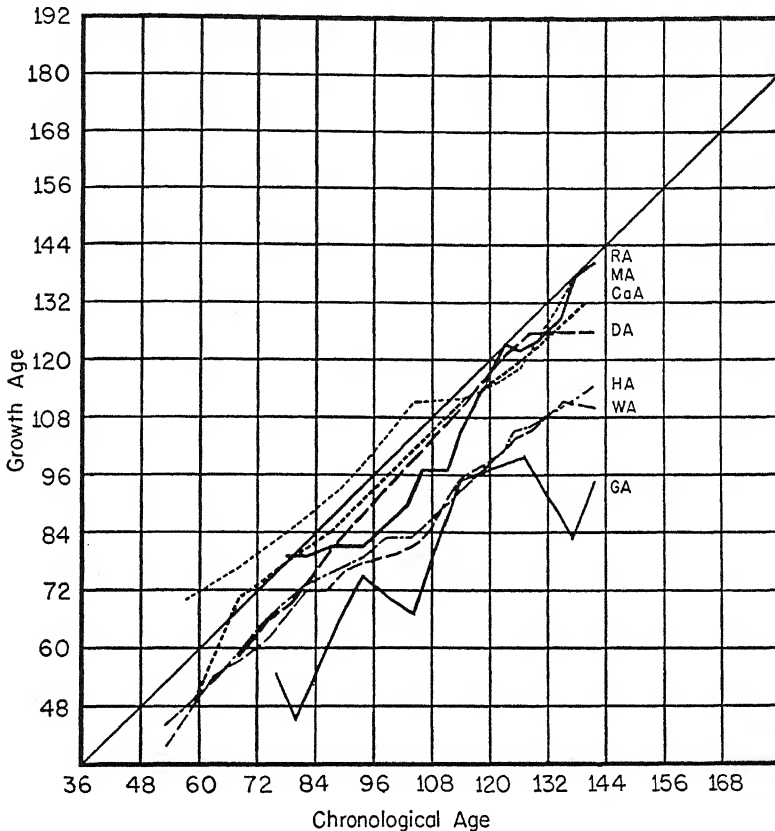
Figure 23. Growth Curves of a Slow-Growing Girl Recorded in Age Units. (Op. cit.)

urements of the same children over a period of several years. When these measures for any one child are brought together on the same chart, it is possible to study the rate of growth of the organism as indicated by the several items chosen for measurement. In Figure 22, the growth measurements of a fast-growing child are shown, and in Figure 23 those of a slow-growing child. To make comparisons possible, the growth is recorded in age units. For example, instead of recording height in centimeters or inches, it may be recorded in terms of the average

height of boys (or girls) of that chronological age. If a seven-year-old boy is as tall as the average eight-year-older, he is said to have a "height age" (HA) of eight years. Similarly, curves are shown for weight age (WA), dental age (DA), carpal age (CaA, to distinguish from chronological age—CA), grip age (GA—strength of grip as measured by a scaled spring-squeezing apparatus called a hand dynamometer), mental age (MA—as measured by an intelligence test), and reading age (RA —as measured by a reading test).

In Figure 22, it will be noted that all the measures except CaA and GA before the seventh year are above the "norm," and these accelerate rapidly. It is interesting that the mental ages of both children were the same when they were five, but the other measures at that time indicate a differential prognosis. In Figure 23 the carpal age was a truer indicator of later development than the mental age. An average of all ages at any one time is called the organismic age (OA), which seems to be a truer indicator of future development than any one measure alone (Figure 24). As a rule, the faster-growing child, with a higher "organismic quotient" (OA ÷ CA), tends to be better adjusted and is more frequently chosen by the sociogram technique than is the slower-growing child. Certainly the latter in his age group is more often frustrated. Teachers should not be called upon to try to browbeat a child into doing work that is beyond his capacity as indicated by his level of growth. This is almost if not quite as foolish as it would be to encourage him to ossify his bones or erupt his teeth more rapidly! He might be willing, but he just can't do it. And to be constantly nagged or even encouraged about his school work will not help either. The processes of nature are slow. And if the environment is good, he will do well enough when he has achieved sufficient maturity for the task.

Perhaps a brief word of caution about interpreting these facts too freely should be inserted. While it is true that a child will learn to read, for example, more quickly, easily, and enjoyably when he is a little older that he would have say, a year or two earlier, he still has to learn to read, and this learning is more efficient when he is taught. While some bright children practically teach themselves, this is not true of all, as the thousands of illiterates could testify. One *learns* to read, or write, or play the violin, or think logically. These things do not come merely by the process of maturing. Given an environment that is conducive to learning, much will be acquired without formal instruction. But any degree of mastery requires competent instruction and a great deal of practice. The nature of the learning process and the implications for teaching will be discussed in detail in the later chapters of this volume.
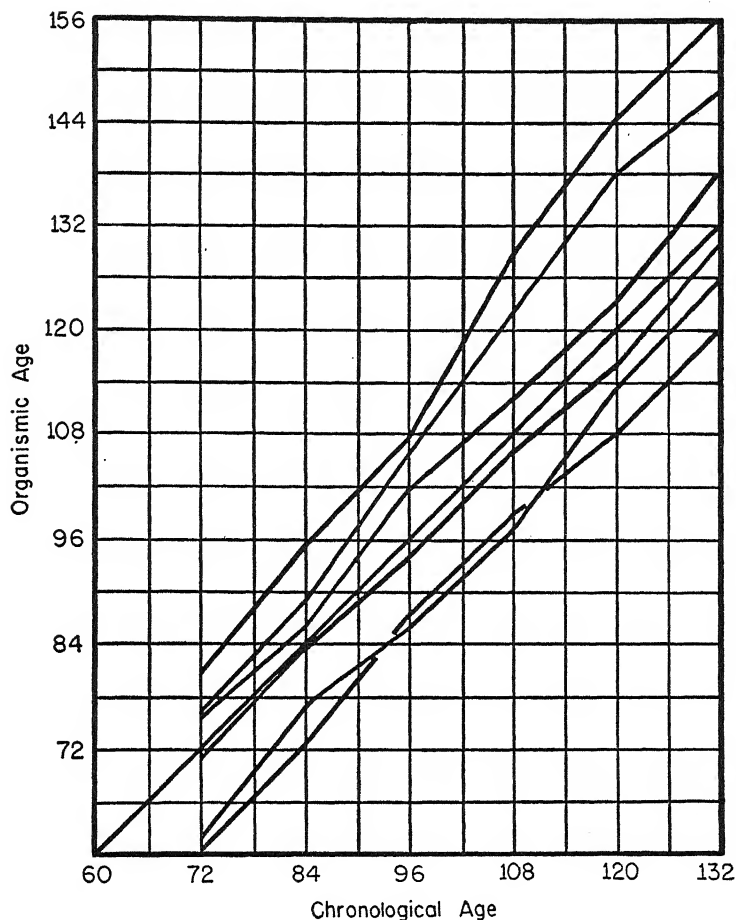
Figure 24. "Organismic Age" Curves of Boys. The average of all the obtained "ages" is found for each period of measurement, and when these are plotted for a pupil, a line of development results that is quite uniform throughout.

The Simplex Growth Curve. The similarity of the curves of growth which appear in this chapter may have suggested to the reader that there is some biological process at work fundamental to them all. Gompertz, in 1825, noted the fact that under unusual conditions the gradual death rate of youth accelerates as maturity is reached, and this acceleration becomes negative in old age since fewer people die in the eighties and nineties, say, than in the fifties and sixties. He concluded

that such mortality statistics follow a logarithmic curve (like those in Figures 25 and 26). This curve seems to have a much wider applicability.

In fact, Courtis (1928) used this formula in the treatment of widely different kinds of data of different investigators, drawing from both the vegetable and the animal kingdom. He found that it applies with an accuracy as close as 1 or 2 per cent, "whenever an individual, or a group made up of a normal distribution of nature elements, grows toward a defined maturity, under conditions such that neither nature nor nurture changes in amount or quality during the period of growth."

Of course, in the case of educational no less than in more directly biological phenomena, absolute constancy cannot be expected. And when the variability is marked, the resultant form of the curve is quite different. Thus a desvastating pestilence would affect the form of the mortality curve; a week of cold weather in midsummer, the growth of grain; a famine. the curve of weight; and a summer vacation, the
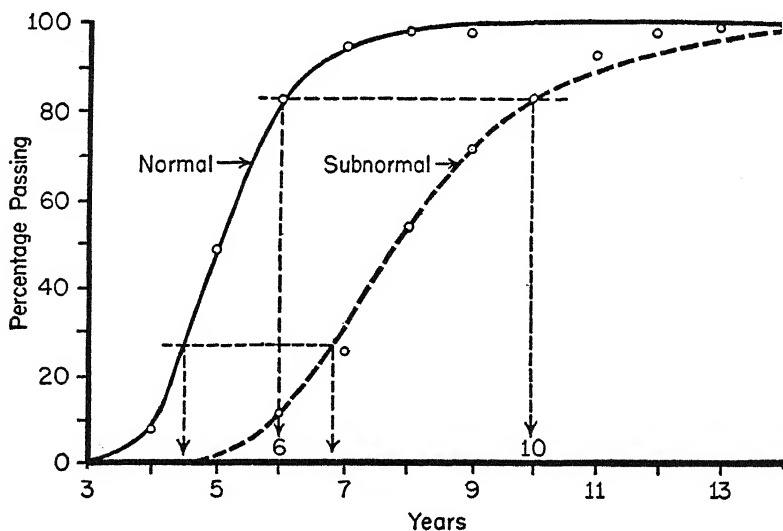
Figure 25. Growth Curves: Effect of Nature. Comparison of growth curves of normal and subnormal children in ability to "name four coins," drawn from Burt's data on the intelligence of London children. The horizontal line at 82 per cent cuts the normal curve at six years of age and the subnormal curve at ten years of age. Thus the subnormals at ten years of age have the same achievement as normal children of six. (S. A. Courtis, "Factors Conditioning Growth," *Papers of the Michigan Academy of Science, Arts, and Letters,* vol. 10, 1928, 349–367.)
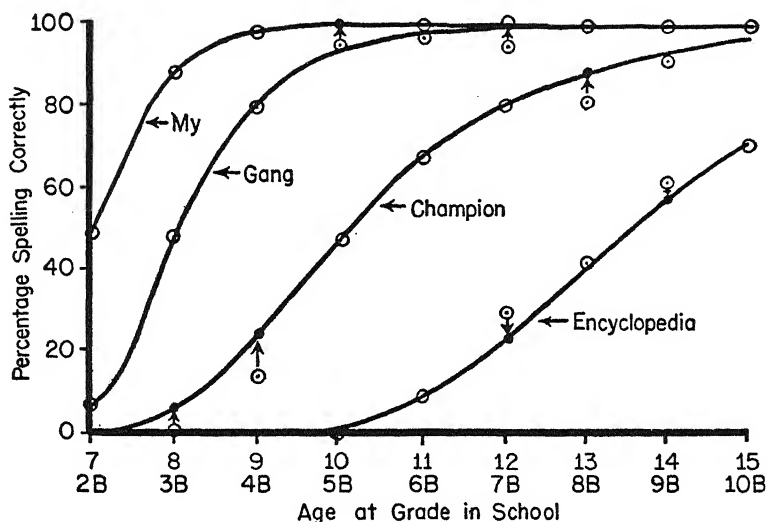
Figure 26. Growth Curves: Effect of Complexity or Difficulty. Comparison of curves showing the percentages of the same group of children in grade-at-age spelling correctly the words, *my, gang, champion, encyclopedia,* drawn from the unpublished data of a school survey of Hamtramck, Michigan. The curves as drawn are mathematically perfect simplex curves; actual observations are shown by the small circles. The words were selected because they were not in the course of study. (S. A. Courtis, "Maturation Units for the Measurement of Growth," *School and Society*, vol. 30, November 16, 1929, 683–690.)

growth in ability in arithmetical computation. The resultant curves, like the lymphoid curves (Figure 21), would be *complex*. But in our surprisingly standard society it is possible to control a number of factors rather well; and, when this is done, growth can be plotted as a *simplex* curve, as illustrated in Figures 25, 26, and 27. As Courtis (1929) states it,

The four essential characteristics of simplex growth are:

1. Progress towards a defined maturity which takes place in
2. An immature organism of constant nature when it reacts to
3. Constant nurture under
4. Constant conditions

The curves differ only in the total time required for maturation. Since this is the case, "when all other factors are held constant, the effect of

any single variable may be measured by the change produced in the total period of maturation."

In the data represented by Figure 25 variations in nature (in this case intelligence) are shown. In Figure 26, since the children were all in
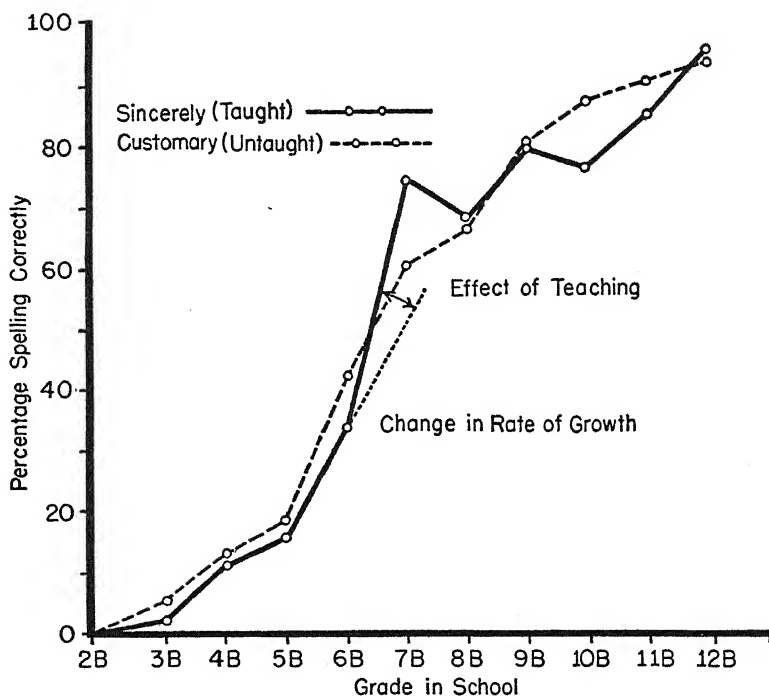
Figure 27. Growth Curves: Effect of Nurture. The curves are based on the percentages of children in the various age-grade groups who spell the given words correctly. The dash line is for *customary*, which is not in the course of study; the heavy line is for *sincerely*, which is taught in Grade 7B. (S. A. Courtis, "Goals of Health Education," *The Research Quarterly*, vol. 1, October 1930, 86–99.)

the normal grade for their age, the intelligence factor is held relatively constant, and the differences of difficulty or complexity are demonstrated. Figure 27 suggests the sadly temporary effect of formal instruction.

As psychological and educational measurements become more and more accurate, the possibilities are disclosed of using such an analytical technique as this to separate the items and use them for purposes of

prognosis, and for the more accurate measurement of the effect of instruction in terms of the actual growth of the individual whether that growth be in the language skills or in the wider aspects of social adjustment.

In Summary

Certain biological factors are of prime concern educationally, among the most important of which are pupil health, physical deviations, hereditary structure, and the growth process. These factors not only largely determine the kind of educational job that can be done, but they themselves become matters of curricular concern. Children are entitled to live in a healthful environment, but they also need to know how to maintain healthy bodies.

Every teacher, in one way or another, has to adapt the school program to the needs of the physically handicapped. Sensory defects constitute the chief responsibility, and, though the teacher neither diagnoses nor treats cases, he suspects or notes defects and recommends examination and treatment. He further has the task of providing as normal a life experience as possible for the handicapped, at the same time adapting the program so far as possible to their capacities.

Hereditary factors, which tend to further the individual's progress in school as well as to handicap him in some of his undertakings, are likewise a matter of concern to teachers. The nature of the processes involved, after the pioneer work of Mendel and Galton, has largely been carried on in the biological laboratory. Sociological and psychological studies of individuals and groups and of similar and dissimilar twins, however, reveal that heredity sets definite though indeterminate limits, but that, within these limits, environmental factors are extremely influential.

The abilities of children mature rapidly during the growing period and become the basis on which curricula are built and methods chosen. Body parts and functions do not grow regularly, but show changes in acceleration and differences among themselves. They are all apparently a function of basic organismic growth. Differences in the rate of growth of different children point to the necessity of adapting school tasks to their levels of development.

Questions

1. How can pupils, teachers, and parents cooperate in improving the health program of the school?
2. In what ways, if any, do schools contribute to physical defects?

3. Show how the proper treatment of physical handicaps is advantageous from the mental hygiene point of view.
4. What mistaken ideas have been heard expressed concerning the influence of heredity? environment?
5. How do hereditary factors differ from instinctive?
6. What value is there in the concept of MG-age?
7. Discuss the scheme of making such activities as driving a car, voting, holding office, and speaking in public depend upon one's stage of growth and development. What privileges now are granted on this basis?
8. What mistakes of parents in child care can be corrected by a more adequate knowledge of growth?
9. Describe some of the characteristics of growth during the different stages of development.
10. Discuss: The school is a social institution which aims to provide an environment gradually increasing in complexity as the child increases in his capacity for response.
11. What are some of the problems met with in the education of handicapped children?
12. What inferences for education are to be drawn from the concept of the organism as a whole?

Readings

Blatz, W. E., and others. *Collected Studies on the Dionne Quintuplets.* Toronto: University of Toronto, 1937.
Similarities and differences in early growth and development.
Frampton, M. E., and H. G. Rowell. *Education of the Handicapped.* Yonkers-on-Hudson: World Book, Vol. I, *History,* 1938; Vol. II, *Problems,* 1940.
Elaborates the details of the psychology and treatment of the handicapped.
Jones, Harold E. *Development in Adolescence.* New York: Appleton-Century, 1943.
Various aspects of growth of a normal boy in relation to home and school life.
National Society for the Study of Education. *Intelligence: Its Nature and Nurture.* Part I, "Comparative and Critical Exposition"; Part II, "Original Studies and Experiments." (*Thirty-ninth Yearbook.*) Bloomington: Public School Publishing Co., 1940.
A comprehensive summation of the various studies of and approaches to the concept of intelligence. Treatment includes historical background, physiological correlates, the nature-nurture controversy, and a compilation of original studies and experiments.

Newman, H. H. *Multiple Human Births*. New York: Doubleday, Doran, 1940.

The genetics of fraternal and similar twins.

Newman, H. H., F. N. Freeman, and K. J. Holzinger. *Twins: A Study of Heredity and Environment*. Chicago: University Press, 1937.

Emphasizes environmental factors.

Olson, W. C. *Child Development*. Boston: Heath, 1949.

Systematic treatment of longitudinal studies and their implications.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology*. New York: Harper, 1937.

Chapter II contains the reports of a number of interesting studies relating to health. The subtitle of the chapter is "A Neglected Factor in Psychology."

Scheinfeld, A., and M. D. Schweitzer. *You and Heredity*. New York: Stokes, 1939.

Popularly written, with numerous charts and illustrations, this volume sets forth the facts concerning heredity and corrects numerous common misconceptions. An original study of the inheritance of musical talent is included.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.

Pages 27–31, "Materials of Heredity and Their Operation," by H. S. Jennings; 82–84, "The Relation between Learning and Growth," excerpts from Gesell and Thompson, Jersild, and McGraw; 543–555, "Abnormal and Atypical Children and Their Adjustments."

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

Especially pp. 230–233, a twin study of "Maturation as an Explanation of Development," by Gesell.

Turner, Clair E. *Principles of Health Education*. (2nd ed.) New York: Heath, 1939.

Objectives and methods of health education including the treatment of defects in relation to the home, public health, physical education, and medicine.

Whitney, D. D. *Family Treasures*. Lancaster, Pa.: Jaques Cattell Press, 1942.

A popular guide for the study of heredity, with numerous illustrations.

Woodworth, R. S. *Heredity and Environment: A Critical Survey of Recently Published Material on Twins and Foster Children*. (Bulletin No. 47.) New York: Social Science Research Council, 1941.

The story of the experimental studies of the problem, clearly told. The various claims of hereditarians and environmentalists are discussed.

Intelligence and
Individual Differences

Intelligence and Adjustment. The importance of intelligence in human adjustment has been implied in earlier chapters in connection with the discussion of social adaptation, of frustration, and of growth. Those who are mentally incapable of harmonizing their conduct with the relatively complex demands of the community in which they live are restricted to the simpler environment of an institution where they are under the direction and control of others. Frustrated persons may, of course, be competent mentally, and yet may attempt to satisfy their desires and needs in ineffective ways. As children grow toward maturity, their physical development is paralleled by their growth in intelligence, enabling them to deal more adequately with the more complex patterns of their natural and social environments.

1. INTELLIGENCE DIFFERENCES

Intelligence in School. The inability on the part of an individual to cope with the situations which confront him may be due to one or more of a number of factors: to a lack of experience, to a lack of special training, to temperamental unfitness, and to immaturity, as well as to a lack of sufficient intelligence. So far as the school is concerned, however, probably intelligence is the most important single factor in success or failure. Though the ardent devotee of democracy may resent invidious distinctions between his fellows on the basis of their natural endowments, he makes them, nevertheless, and he has made them since early childhood. What fourth-grader does not know that some can do their school work successfully, while others are always wrong and always behind! What teacher using the traditional marking system does not realize that some pupils experience difficulties which others do not know exist!

Ever since there have been schools, the task of educating children of different levels of ability has presented many problems. The normal children have generally moved along at the expected rate, and the superior, while sometimes annoying, have usually been a source of pride to their teachers. But the dull have caused disappointment and trouble. They have usually been either neglected, or frustrated by the efforts made to force them into a superficial conformity with the school program. The importance of providing the most suitable kind of education for children of widely different intelligence is recognized by all educators. But the determination of just what that education should be is a continuing problem. Better solutions are likely to be found when teachers know something of what intelligence means, how it is measured, how tests are to be interpreted, and how the results can be used to modify the curricular demands made upon the pupils.

Early Criteria of Intelligence. While differences in intelligence have long been recognized, they were not intensively studied until recent years. The first systematic differentiations were legal and employed an *economic criterion.* The economic irresponsibility of the idiot was recognized in an English "intelligence test" of the year 1534:

And he who shall be said to be a sot and an idiot from his birth is such a person who cannot account or number twenty pence, nor can tell who was his father or mother, nor how old he is, etc., so as it may appear that he hath no understanding by reason of what shall be for his profit nor what for his loss.

English law differentiated the *idiota a causa et infirmitate,* now commonly called the insane or *demented,* from the *idiota a nativitate,* the *ament* or feebleminded.

The British Royal Commission on the Feeble-Minded in 1904 virtually defined intelligence as the ability to maintain one's self in the economic order: "A feeble-minded person is one who is capable of earning a living under favorable circumstances, but is incapable, from mental defect existing from birth or from an early age, (a) of competing on equal terms with his normal fellows; or (b) of managing himself and his affairs with ordinary prudence."

What may be called a *physiological criterion* for determining intelligence, and other aspects of personality as well, has been explored and exploited. Unfortunately, it has led into blind alleys and even into char-

latanry. Four systems will be briefly described, however, in order to show something of the efforts that have been made in this difficult area, and also to suggest an attitude of caution toward their latter-day forms if this should be necessary.

The first of these systems is *phrenology*, which was elaborated by Gall (1757–1828) of Vienna, whose contribution to the neurology of his day was considerable, and whose phrenological doctrines spread through Europe and America. Even Horace Mann (1796–1859), the eminent American educator, became enamored of their claims in his later years, though he and others were perhaps interested in their ramifications in the fields of hygiene and of physical and social development at a time when these areas were largely neglected by the schools.

Phrenology was based on three principles: (1) The organs of the thirty-seven "faculties" or mental abilities or capacities, such as self-esteem, language, and causality, are located in certain charted areas on the surface of the brain; (2) powerful faculties produce enlargements or bulges; and (3) the bulges push out the skull, with the result that all one needs to do to discover a man's capacities is to explore his cranial contours, or "read his bumps." Phrenology is a discredited pseudo-science because these organs do not represent the true localization of functions of the cerebral cortex and hence do not exist, supporting tissue and not nerve fibers constitutes its bulk, and the brain cannot push out the skull.

The second system based on physiological criteria is *physiognomy*, involving procedures for "reading character at sight." Facial contours, full-face and profile, are classified and paralleled with various intellectual and volitional "types." People who should know better have been taken in by the claims of the physiognomists.

The third system is not a pseudo-science, as the first two are, but is what might be called a disproved hypothesis. Lombroso, the Italian criminologist, around the turn of the century, suggested that there are physiological *stigmata of degeneracy* which characterize low-level, criminal types. Large, outstanding ears, strabismus, low, retreating foreheads, and prehensile feet are examples of such stigmata. The echoes of this hypothesis may be in part responsible for the feeling of shame that some people unfortunately have about physical handicaps.

The fourth system has perhaps gained more popular acceptance than the others. It is based on the hypothesis that *brain size*, and therefore head size, is an indicator of intelligence. It is true that children born with extremely small heads (microcephalics) are idiots, but so also are those with extremely large heads (macrocephalics).

The brains of one hundred distinguished men were found to average 1469 grams, only about 100 grams higher than the general average, 1360,

in a range of 960 to 1810 grams (34 to 64 ounces). It has been concluded[1] from such data that about half of those whose heads are in the lowest 15 per cent of the size range will be found to be suffering from cerebral insufficiency; while about one in fifty of the big heads, those in the upper 15 per cent, will prove to be of supernormal intelligence. Hence "head measurement, and the calculation therefrom of the cubic capacity of the brain, is not a measure of intelligence, and should not be employed for that purpose."[2]

2. What Is Intelligence?

Binet's Definitions. It was the Frenchman, Alfred Binet (1857–1911), who more than anyone else succeeded in taking the problem out of the area of pseudo-science and surmise and in placing it on a firm scientific basis. He took a definitely psychological approach, on the assumption, in the matter of intelligence, that mental abilities are what make the difference, and that therefore mental abilities should be studied, and if possible measured.

From his writings, it is clear that Binet's ideas as to the nature of intelligence changed from time to time and were never sufficiently definite to satisfy a logician. "To judge well, understand well, reason well—these are the essentials of intelligence," he wrote. And later, "Comprehension, invention, direction, and censorship; intelligence lies in these four words." And again, "We have implicitly admitted that intelligence consists in a mental adaptation to a situation which is new to us." But this latter statement is the equivalent of Stern's popular definition of intelligence: "A general capacity of an individual consciously to adjust his thinking to new requirements; it is general mental adaptability to new problems and conditions of life."

Binet's great contribution was the idea that a sample of mental tasks could be selected and standardized, and that an individual's ability to do these would be the best indicator of his ability to do other mental tasks, that is, of his intelligence level. He incorporated this idea in a series of tasks calling for the ability on the part of the child:

1. To remember a series of words or digits long enough to repeat them immediately (memory span).
2. To count, and to do simple arithmetic problems (arithmetical reasoning).

[1] R. J. A. Berry, *Brain and Mind*, New York: Macmillan, 1928, pp. 513–541.
[2] E. L. Thorndike and others, *The Measurement of Intelligence*, New York: Teachers College, Columbia University, 1927, p. 12. By permission.

3. To define and distinguish the meaning of certain words (vocabulary).
4. To interpret pictures, proverbs, and fables.
5. To make simple sensory and esthetic discriminations.
6. To solve simple puzzles, and draw inferences.

A number of things become clear from this abbreviated summary: (1) The ability to do these tasks with facility would be a good, though not an infallible, indicator of the ability to do a number of things that are necessary in adapting to the environment. (2) The tasks are particularly adapted to the lower and middle, rather than to the higher, levels of intelligence. In fact, Binet's main purpose in working out his scale was to find a means more readily to distinguish the lower levels of intelligence from the normal. (3) They leave out of account the importance of special knowledge and skill in the performance of professional duties. (4) They disregard social ease and adaptability, perseverance, and dependability, and other qualities which bulk large in any kind of life success. (5) Neither do they pretend to measure degrees of emotional stability or peculiarities of temperament. The last three points above are not to be construed as adverse criticism, however; other mental characteristics demand other instruments for their measurement.

Intelligence as Adjustment. It is but natural that Binet's varying definitions, as well as the analysis of his tests and of the intellectual processes, should lead to further efforts at delineation. Unfortunately, little unanimity has resulted. The identification of intelligence with capacity to adjust, as it appears in Stern's definition, is echoed again and again in the literature, as in Buckingham's "ability to act effectively under given conditions," in Thorndike's "power of good responses from the point of view of truth or fact," in Freeman's "capacity for successful adjustment," in Pintner's "capacity for getting along in all sorts of situations," and in Colvin's statement that "An individual possesses intelligence in so far as he has learned, or can learn, to adjust himself to his environment."

However, the definition of intelligence as the "capacity to adjust," acceptable as it may seem at first, is based on the principle of the economic criterion, and is definitely relative in its application. The farm hand may be perfectly adjusted to the farm and the Melanesian to his warm sunny island with its plenteous supplies of bananas and breadfruit; but probably neither, as judged by an absolute standard, is more intelligent than a starving homesteader or an unsuccessful candidate for a Ph.D. degree. Spearman further criticized any definition based on the

economic criterion as being biological rather than psychological: it is a "definition in terms of use," which the Binet scale itself recognized as of inferior value. Furthermore, the intelligence tests measure the ability of an individual to "get along" in only a relatively restricted number of situations, usually of the paper-and-pencil type, important as these may often be.

Intelligence as Ability to Learn. Colvin's statement, quoted above, with its phrase, "or can learn," suggests another rule-of-thumb definition of intelligence as learning ability, which would include Woodrow's "capacity to acquire capacity" and Freeman's "quickness of learning, quickness of apprehension." But a child's ability to learn French is by no means invariably the same as his ability to learn algebra, and neither of these may be in perfect harmony with the score on his intelligence test. Then, too, as Thorndike has pointed out, tests of learning ability, which are necessarily either tests of speed of learning or of what one has learned (information), leave out various aspects of the equally important abstracting, selecting, generalizing, and organizing abilities.

Intelligence as Abstract Thinking. Intelligence is often thought of, not only as capacity for adjustment, and more narrowly as ability to learn, but also, as Terman contends, as "the ability to think in terms of abstract ideas." Freeman's "grasp of complicated relationships" is closely akin to this, as is also a concept put forward some years ago by the German psychologist Ebbinghaus (1850–1909), which he called "combination." Ebbinghaus defined combination as "bringing together a multitude of independent concomitant impressions into a unitary, meaningful, or in any way purposive whole." To test this capacity he devised what is now known as the *completion test*, which, peculiarly enough, has been somewhat neglected in a number of currently used intelligence examinations.

The completion test, however, appears in one of the parts of the Thorndike group examination, "Intellect CAVD." This and the other parts, samples of which are given, are presented to clarify the meaning of intelligence as abstract thinking. The initials stand for the four tasks set up to test four lines of ability, as shown below, with a simple and a more difficult example of each:

C. *Completions:* to supply words so as to make a statement true or sensible.
    a. The . . . eats the mouse.
    b. Queen Anne was much . . . to horse-racing, and not only . . .
        royal plate to be . . . for, . . . ran . . . for them . . . .

A. *Arithmetic:* to solve arithmetical problems.

    a. A camp has food enough to last 300 men for 4 months. How long will it last 200 men?

    b. Express in brief form using I, B, and D. "The illumination varies directly as the brightness of the light and inversely as the square of the distance." Use "—K times" for "varies as."

V. *Vocabulary:* to understand words.

    a. sexton   1   cube—2   janitor—3   compass—4   archbishop—5   six singers . . . .

    b. apogee 1 orbit—2 nadir—3 ellipse—4 culmination—5 zodiac . . . .

D. *Directions:* to understand connected discourse as in oral directions or paragraph reading.

    a. "See the square?" [A 1½-inch square is shown at the top of a sheet 8½ by 11.] "Make a ring in the square."

    b. Don't cross the bridge before you come to it [means]:

       . . . . . Look before you leap.

       . . . . . Don't borrow trouble.

       . . . . . Don't lock the barn after the horse is gone.

       . . . . . Take care of today, and tomorrow will take care of itself.

More difficult tests involve multiple choice questions on long paragraphs. Thorndike, in discussing CAVD, comments on the nature of original capacity as measured, and on its relation to training:

We have defined intellect as that which produces intellectual products, succeeds with intellectual tasks. We thus include not only the native, inherent capacity which a person has for such successes, but also whatever education has been added thereto, and whatever increment of success he has with intellectual tools. . . . We are measuring available power of intellectual achievement without any specification as to its genesis. A person who has acquired the intellectual tool, reading, probably has a considerable advantage over one of equal original capacity who has not acquired that tool, in the harder completions and directions. One who has studied arithmetic surely has a notable advantage in many of the arithmetical problems of our series over one of equal original capacity who has not studied it. This procedure would be open to criticism if we should assume that the score made in the series is a measure of original capacity to grow into or acquire intellect, without proving that it did so. We shall not: nothing about the causation of the ability measured by the series will be taken for granted.

The procedure will be criticized by others as a failure to separate original capacity from the circumstances of training and to select tasks which would measure the former alone. This is an attractive enterprise, but not, in our judgment, so important as the measurement of intellect

as it actually exists and works. We also doubt whether it can be achieved until the latter has been. There is also danger that, if we include in a series of intellectual tasks only those in whose accomplishment differences of education can make little or no difference, we shall have a collection of freakish puzzles, irrelevant to the actual operations of intellect by persons twelve years or older in the United States today—or possibly have nothing at all.[3]

And yet, when groups have been given Intellect CAVD and the Thorndike or Otis or National Intelligence examinations, the results are quite similar, showing that all these tests, whatever their claims, measure much the same thing. These include "attention, retention, recall, recognition, selective and relational thinking, abstraction, generalization, organization, inductive and deductive reasoning, together with learning and knowledge in general"[4]—in short, what have long been termed the cognitive processes. The tests may discover how many simple tasks a person can do in a given period of time, which may be called the *extent* of intellect; or they may discover, by presenting a graded series, how difficult a task he can perform—the *altitude* of intellect. If a subject can do a number of such tasks that only 10 per cent of the population can do or be taught to do, they are difficult tasks, and he is of high intelligence. It is probable that he can also do most of the tasks that the other 90 per cent can do, or at least that the lower 50 per cent can do, and do them more quickly.

The Multi-Factor Theory. Intelligence would then seem to depend on the number of such different intellectual tasks an individual can perform. This is the basis of Thorndike's so-called multi-factor theory of intelligence. As he states it:

The gist of our doctrine is that, by original nature, the intellect capable of the highest reasoning and adaptability differs from the intellect of an imbecile only in the capacity for having more connections of the sort described.[5]

The word "connections" here refers to the fact that responses are connected with different specific stimuli. Intelligence is thus measured by a sample inventory of tasks. The inference is that the larger the number of varied connections found in the sample, the larger is the number that actually exist, and hence the more intelligent is the person concerned. Whether or not these "connections" have their neurological

[3] From E. L. Thorndike and others, *The Measurement of Intelligence,* New York: Teachers College, Columbia University, 1927, pp. 95–96. By permission.

[4] Thorndike, *op. cit.,* p. 22.

[5] *Ibid.,* pp. 421–422.

correlate in the number of synaptic connections between cortical dendrites and axones is not known. This seems possible, but the theory does not depend on the possibility. It can be stated negatively as follows:

No special qualitative differences are required to account for differences in degree of intellect; the higher processes or powers have no other basis in original nature than that which accounts for differences in the number of bonds (or connections) of the associative type.[6]

The Two-Factor Theory. The atomistic, multi-factor doctrine of Thorndike differs somewhat from that put forward by Spearman, who set up a two-factor theory. He called attention to the fact that in general those who do well on one type of mental test tend to do well on other types.

This continued tendency to success of the same person throughout all variations of both form and subject matter—this is to say, throughout all conscious aspects of cognition whatever—appears explicable only by some factor lying deeper than the phenomena of consciousness. And thus, there emerges the concept of a hypothetical *general* and purely *quantitative* factor underlying all cognitive performances of any kind. . . . But if, thus, the totality of cognitive operations is served by some general factor in common, then each different operation must necessarily be further served by some *specific* factor peculiar to it.[7]

The general factor he designated by the letter *g*, the specific factor by *s*. Concerning the general or *g* factor and its relation to the "prevalent practice of actual testing," Spearman said, "Our *g* is in fact, really obtained by this practice, with rough—much too rough—approximation. And it will be obtained the more exactly, as the procedure is freed from undeniable defects. . . ."[8] He interprets it in terms not only of intelligence, but of will, of mental energy, and of physiological conditions including neural plasticity, blood supply, and glandular and respiratory efficiency. "The *g* proved to be a factor which enters into the measurements of ability of all kinds, and which is throughout constant for any individual, although varying greatly for different individuals."[9]

Spearman takes as an indication of the general acceptance of his two-factor theory that it is implicit in the "more and more open usage of

[6] *Ibid.*, p. 421.

[7] C. Spearman, *The Nature of Intelligence and the Principles of Cognition,* London: Macmillan, 1923, p. 5.

[8] C. Spearman, *The Abilities of Man,* New York: Macmillan, 1927, p. 84.

[9] Spearman, *op. cit.,* 1927, p. 222.

the very terms, general ability and specific abilities, the latter including such items as talent for the classics where the ratio of influence of g to that of s was rated to be as much as 15 to 1. And at the other extreme was talent for music, where the ratio was only 1 to 4." He says further, by way of explaining g and s: "Strictly speaking, there are no such things as 'special abilities' for all abilities involve more or less of g and therefore are not altogether special. What really exist are special—or better—'specific' *factors*. But these are in some abilities so preponderant that, for most purposes, the g factor can be neglected."[10]

The Primary-Abilities Theory. A third view of the nature of intelligence is that it is composed of a number of factors or primary abilities. The statistical treatment of responses to the items on intelligence tests employed to obtain these factors (and also of other factors on other tests) is called factor analysis. The technique is based on the idea that some people are much more adept in the use of words, for example, than they are in the use of numbers, and vice versa. Both abilities are called for on the usual tests, which therefore give a kind of composite result. If these and other abilities are separated from the composite, it is discovered that, say for two people whose intelligence score is approximately the same, there may be considerable difference in their performance when they are tested for the separate abilities.

These abilities have been listed by Thurstone, as follows, and separate tests have been developed for them. After each primary ability is a brief clarifying statement showing what the subject who takes the test does:

1. Number facility: Thinks numerically as revealed in numerical speed tests.

2. Word fluency: Uses words with facility, as revealed in synonym-antonym tests and anagrams.

3. Visualizing: Perceives three-dimensional aspects of two-dimensional patterns, such as drawings of piles of cubes.

4. Memory: Remembers names, words, and numbers.

5. Perceptual speed: Identifies small differences in designs quickly, or readily selects needed items from a page.

6. Induction: Discovers a principle or rule as in number-series completion. (The ability corresponds closely to Spearman's g.)

7. Verbal reasoning: Deduces particulars from the general as revealed in verbal analogies and proverbs.[11]

[10] *Ibid.*, p. 211.
[11] L. L. Thurstone, "A New Conception of Intelligence," *Educational Record*, Vo. 17 (July, 1936), pp. 441–450. Also, *Primary Mental Abilities*, Chicago: University of Chicago Press, 1938.

Three theories of the organization of intelligence have been briefly presented. The first (Thorndike) depends on separate mental bonds or connections, that is, the number of adequate responses the individual can make to various stimuli. The second (Spearman) depends on general and special factors, while the third (Thurstone) is based on a number of primary factors. Tests based on the latter theory are being employed somewhat experimentally in cases in which some one or more of the primary abilities seems particularly important. Composite intelligence tests are recognized as part of the classification machinery of every modern school system, playing their part in the important task of adapting the work of the school more adequately to the abilities of the individual boys and girls.

3. The Individual Intelligence Test

Pioneer Work of Galton and Cattell. The beginnings of the testing movement are to be found in the studies made in 1882 by Francis Galton. He included tests of keenness of vision and hearing, strength of grip, and reaction time. In addition to these, he devised the weight-discrimination test, which was derived from the earlier psychophysical experimentation, and which appears in some of the current individual intelligence examinations. Galton placed the emphasis upon sensory discrimination because all judgment and intelligence are dependent in the first instance upon sense perception; hence perceptual differences would seem to furnish an index of intelligence.

James McKeen Cattell, in an article published in 1890, was probably the first to use the now familiar term "mental test." At that time, and also as early as 1885, he described some tests which were given to Columbia College freshmen. These included the ones used by Galton and were aimed to test the following capacities as well: after-images, color vision, perception of pitch, sensitivity to pain, color preferences, perception of time, accuracy of movement, rate of perception and movement, imagery, and memory. He standardized his procedure more carefully than had been done before; and others, following his lead, administered these and other tests, among them the memory-span-for-digits test originally devised as a test of "span of prehension." As early as 1883 a number of such tests were administered to more than a thousand school children of different ages and their scores were compared with teachers' estimates of general ability. The results were not particularly helpful for the reason that a number of measures of individual differences were included which bore little or no relation to the processes involved in school progress. The name that was given to the necessary

mental characteristic was intelligence, but the direction which its investigation would take was still to be determined.

Alfred Binet. A fresh start was made by Binet, working with the school children of Paris. An account of his work will be given in some detail for two reasons: It reveals something of the slow, painstaking effort with which scientific work is carried on, and it leads to a better understanding of the basic instrument of intelligence measurement.

Though many of the phenomena with which psychology concerns itself are phenomena of intelligence, including sensation and perception, it seemed to Binet a waste of time to examine these things after the manner of the psychophysicists. He thought the thing that should be examined was "a more fundamental faculty, the alteration or lack of which is of utmost importance for practical sense, initiative, the faculty of adapting oneself to circumstances." But this was in 1905, after he had spent ten years running down every possible clue which might lead to a more accurate determination of individual intelligence. With his collaborator, Simon, he had investigated head measurements, the two-point threshold of skin sensitivity, graphology, and a little later, palmistry (though somewhat apologetically), and found that, where there is any differentiation between the normal and the backward, it is so very slight as to be of no value whatsoever in individual diagnosis.

As early as 1895, Binet had criticized the narrow selection of tests used by Galton and his American followers, and had laid out a broad program of investigation, including tests of memory, imagery, imagination, attention, comprehension, suggestibility, esthetic appreciation, moral sentiments, muscular force and force of will, motor skill, and judgment of visual space. Among the tests suggested are many which have been retained through all subsequent revisions; for example: visual memory of geometric design, memory of a sentence, memory span for digits, description of pictures, similarities and differences between synonyms, and the criticism of absurdities. Other familiar laboratory tests which have been dropped out of the intelligence examination are the test of musical memory, esthetic judgment for differently shaped rectangles, and tapping. A number of others, now more or less familiar, were also suggested.

In 1898, the disarranged sentences test (in which the words are in a mixed-up order to be straightened out) and the paper-folding, induction test were included. Two years later he added the drawing from memory of the truncated pyramid and Greek key pattern, which has

been retained, and a cancellation test (in which the subject rapidly draws a line through a specified letter or digit each time it appears in a long series) and a speed of reaction test, which have been dropped out. By 1903, Binet had developed the picture description test and added the sentence completion, invented by Ebbinghaus, so that by 1905 he had thirty tests arranged in order of difficulty and so forming a kind of scale.

This scale [Binet wrote] is not a theoretical work; it is the result of long investigations, first at Sâlpetrière [the great institution for feeble-minded and insane in Paris], and afterward in the primary schools of Paris, with both normal and subnormal children. These short psychological questions have been given the name of tests. The use of tests today is very common, and there are even contemporary authors who have made a specialty of organizing new tests according to theoretical views, but who have made no effort patiently to try them out in the schools. Theirs is an amusing occupation, comparable to a person's making a colonizing expedition into Algeria, advancing always only upon the map, without taking off his dressing gown. We place but slight confidence in the tests invented by these authors, and we have borrowed nothing from them. All the tests which we propose have been repeatedly tried, and have been retained from among many which after trial have been discarded.[12]

Even in this scale, tests appeared which were later dropped out, the Ebbinghaus completion test, for example, a test of immediate memory for objects seen in a picture exposed for 30 seconds, and a test of suggestibility. But in it, also, was included the reversal of the hands of the clock (in which the subject tells what time it would be if at given times the hands were reversed), the synthesis of three words in one sentence, rhymes, resemblances of three known objects, memory span for digits and words, and many other tests which have been retained.

After this scale appeared Binet wrote,

We have aimed to make all our tests simple, rapid, convenient, precise, heterogeneous, holding the subject in continued contact with the experimenter, and bearing principally upon the faculty of judgment.[13]

In the article presenting this scale he wrote,

Our purpose is to be able to measure the intellectual capacity of a child who is brought to us in order to determine his intellectual level,

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[12] From A. Binet and T. Simon, *The Development of Intelligence in Children,* Baltimore: Williams and Wilkins, 1916, p. 41. By permission.
[13] Binet and Simon, *op. cit.,* p. 41.

and, in order better to appreciate this level, we shall compare it with that of normal children of the same age or of an analogous level.[14]

It is therefore but a short step to the organization of the satisfactory tests according to age groups; however, it was not until three years later that the 1908 scale appeared, the first to be constructed on the *mental-age* basis. A test was used for a certain year if from 60 to 90 per cent of the children of that age passed it.[15] Another revision, which appeared in 1911, the year of Binet's death, made such additions and corrections as subsequent testing had shown to be necessary.

The Individual Test after Binet. Translations and revisions of the Binet-Simon scale appeared in other countries, some of them before the French 1911 revision. William Stern adapted the scale to German use, and for the first time employed the ratio of mental age to chronological age, later called the "intelligence quotient" by Terman, as a measure of brightness. The first adaptation of the scale in America was that made by Goddard, who used a translation of the 1905 scale and later of the 1908 scale in the Vineland, New Jersey, Training School for the Feeble-Minded, of which he was then the director.

The scale most frequently used, however, is what is known as the *Stanford Revision of the Binet-Simon Intelligence Scale*, completed in 1916 by Lewis M. Terman and his colleagues at Stanford University, and revised again in 1937.[16] In the first revision, the interpretation of fables, the vocabulary test (giving the meanings of a list of words), and the ball-and-field test (drawing the path one would take to find a ball lost in a circular field) were added. The later revision extended the scale downward to include the mental age of two, and additional tests were included in the "superior adult" grouping. Likewise, an equivalent form was developed, and a modification of the method of computing the intelligence quotient for those around sixteen years of age or older. Like Binet, Terman actually tried out his revisions on school children, using the results from hundreds of testings in their construction.

Units of Measurement. As a consequence of the development of mental-age units the terms applicable to different degrees of intelligence could be given more exact meaning than previously, as shown in Table 6.

[14] *Ibid.*, pp. 37, 39.
[15] *Ibid.*, p. 298.
[16] See L. M. Terman and M. A. Merrill: *Measuring Intelligence,* Boston: Houghton Mifflin, 1937. See also P. Cattell, *The Measurement of Intelligence of Infants and Young Children,* New York: The Psychological Corporation, 1940, and D. Wechsler, *The Measurement of Adult Intelligence,* Baltimore: Williams and Wilkins, 1939.

Only the word "moron" is a recent coinage; it is derived from the Greek *moros*, meaning foolish, and is applied to the higher grades of feeble-mindedness. Whatever names are given to different MA or IQ levels, they are, of course, quite arbitrary, since there is no actual line of demarcation between them. The ones given, adapted from Terman and Kuhlmann, are in accord with common usage. However, in making and reporting studies, the figures are more commonly employed than

TABLE 6 *Conventional Nomenclature of Different Intelligence Levels*

ADULT MA	CLASSIFICATION	IQ	PERCENTAGE OF POPULATION
22.6–	genius	175 and above	
19.6–22.5	precocious	150–174	3½
	very superior	130–149	
18.0–19.5	superior	120–129	8
16.6–17.11	bright	110–119	16
13.6–16.5	normal, average	90–109	45
12.0–13.5	dull, backward	80–89	16
10.6–11.11	borderline	70–79	8
7.6–10.5	moron	50–69	
3.9–7.5	imbecile	25–49	feeble-minded 3½
0–3.8	idiot	0–24	

the names, as are the degrees of temperature on a thermometer instead of "summer heat," "freezing," and so on.

The mental ages in the table, of course, apply to adults only, as an eight-year-old child, for example, with a mental age of eight would be of normal intelligence, and not a moron. The *intelligence quotient* or IQ (sometimes called the "intelligence ratio," or IR) is computed by dividing the *mental age* (the score on the Stanford-Binet Examination) by the *chronological age*, or number of years and months old the individual is when tested, i.e., IQ = MA/CA. The division is carried to two decimal places, but the decimal point is omitted. Thus, the eight-year-old child above referred to, with a mental age of eight, would have an IQ of 100. If CA is 8 and MA is 10, then the IQ is 125, a superior child. If CA is 8 and MA is 6, then the IQ is 75, a borderline case.

Terman's original method (1916 edition) of computing the IQ's of persons 16 or older was to use a CA of 16, based on the fact that the

normal IQ's do not measurably improve beyond this point. The figure had been derived from testing high-school groups, which do not make up a random sampling of the population. Instead, they constitute a selected group since they are composed of pupils who are able to stay in school. Furthermore, this technique produced a sharp break in the curve at age 16, which is not in harmony with what is known about the gradual deceleration of the curves of growth. The 1937 revision corrects the method of deriving IQ's by the use of a graduated scale.[17]

To compute the IQ of an individual beyond age 13 up to 16, his chronological age is taken as 13 plus 2/3 of the number of months he is older than 13. For 16 or over, a CA of 15 is used in obtaining the IQ. For example, for one who is 14, the mental age is divided by 13 years 8 months (13–8); for one who is 15, by 14–4.

The Constancy of the IQ. The convenience of the IQ in classifying pupils within a grade is at once obvious. If a third-grade child is found to have an IQ of 125, he is recognized immediately as one who will probably make rapid progress through the grades and be able to go on through high school and college. An IQ of 80, on the other hand, suggests the need of special treatment and the high probability of early elimination from school.[18] However, a number of factors make for uncertainty of prediction of school progress, especially for individual children. These may be enumerated as follows:

1. The imperfection of the instrument. An intelligence scale at best is but a sampling of tasks which are chosen as being representative of many kinds of mental responses made to the complex factors in the culture.

2. The attitude of the person being tested. A child would have difficulty in obtaining a mental-age rating higher than he deserves; but an unwillingness to answer questions will result in a much lower score than he should have. The tester is supposed to maintain *rapport* with the testee, that is, to create the kind of situation between them in which the child is favorably disposed toward the procedure and tries to do his best. It is not always possible to maintain rapport, however; and in routine testing, children, especially those who have gotten into trouble and have been interviewed repeatedly, develop a negative attitude and may fool the examiner into thinking they are trying.

[17] L. M. Terman and M. A. Merrill, *op. cit.,* p. 31, Table 4.
[18] L. M. Terman, *The Intelligence of School Children,* Boston: Houghton Mifflin, 1919. By permission.

3. The technique of the examiner. Rapport may not be obtained; and, furthermore, an inexperienced examiner may forget that he is not teaching and may try to help the child to answer the questions, or he may make mistakes in scoring.

4. Inequalities in opportunities. The sampling of questions involves the use of learned responses—language and the meaning of words, for example. If a child has had little or no opportunity to acquire language skills, his score will be lower than that of the child who has had such opportunity. The test assumes that those tested have had equal opportunities to learn, an assumption that is fairly well founded in localities where there is free compulsory education.

5. Irregularities in human growth. Since the IQ is a ratio, it remains constant if mental growth continues at a constant rate, whether that rate is below or above average. But studies of growth, some of which have been reported in the preceding chapter, reveal the fact that a child's growth may be somewhat irregular, proceeding slowly perhaps, and then accelerating. This is true of both physical and mental measurements.

In view of these conditions it may seem surprising that any prediction of school success is possible. However, the chances are even that a second test will or will not vary more than 4.5 points either way. That is, of ten pupils who test 110, five of them when retested will score between 105.5 and 114.5. The average chance variation is but 1.7. It can be concluded, therefore, that if a child is tested twice, and if at the second testing, two or three years later, the IQ is about the same as it was on the first test, if the conditions enumerated above are favorable, the approximate intelligence level has been found. Because of the influence of the variable factors listed above, however, it is desirable to have the tests administered and interpreted by trained persons. It is also desirable that teachers understand the nature of the test and realize that variations in the IQ may occur. Although it tends to remain constant, there are exceptions. And since there is no way of knowing from the test results which children are going to be the exceptions, the IQ should always be considered tentative and "subject to change without notice." If there seems to be a discrepancy between a child's school marks and his intelligence rating, both should be suspect, and the latter should be checked by later retesting.

For the great majority of children, however, the intelligence level obtained consistently from two or three testings will be the level upon which they will remain for the rest of their lives. Some consider this all very discouraging, especially to the child with a low IQ, and even

declaim against the injustice of such "determinism" as being undemocratic. But, though a knowledge of his IQ might discourage a child unnecessarily, his intelligence is what it is, whether it is measured or not. If his score is inaccurate, or if he has been underprivileged, or if he is slow-growing, it may improve. But fortunately, even if it does not, there are many different things that individuals can do or can be trained to do. A knowledge of the IQ makes it possible to adjust to the situation earlier and more intelligently.

Non-Linguistic Tests. The items on the Stanford Revision of the Binet Scale call primarily for linguistic ability. Indeed, an illiterate person, or a pupil brought up to speak only a foreign language, though he may have great potential intelligence, could make but a poor showing on this particular scale. Even when word meanings are not directly called for, the directions are in English, and most of the responses are verbal. This works a manifest injustice to children in isolated communities where the educational opportunities are meager, and to the foreign-born child, or the child of foreign parentage. For this reason an effort has been made to standardize tasks requiring intelligence, but no words. These efforts have met with considerable success. The form board, first introduced by Seguin, has undergone various modifications, the principle being that of fitting differently shaped pieces of wood into their proper places; depressions in a board are so cut as to fit the pieces when they are correctly arranged. A so-called paper form board requires the subject to show by drawing in a square how various drawings of smaller figures would fit into it.

Then, too, variations of the picture puzzle have been standardized. And the pencil maze or labyrinth is another type of task, success in which seems to correlate highly with intelligence as otherwise measured.

4. The Group Intelligence Test

The Time Factor. Since it takes approximately an hour to administer an individual test, it becomes a laborious and expensive proposition as soon as a school testing program is undertaken. A. S. Otis, who was a student of Terman's at Stanford, arranged certain tests in such a way that they could be given to large groups all at one time. He and other psychologists worked this into a series of tests, called the Army Alpha Intelligence Examination, which was used for classifying recruits in the cantonments in 1917 and 1918. This examination contained eight tests, each with a time limit, so that at the proper time the examiner directed the examinees to turn over the page and, after reading the direc-

tions, start on the new test. Each test was sufficiently easy for every literate person to do some of it, and hard enough so that very few could do it all in the allotted time.

Sample Tasks. The tasks on the Army Alpha, which formed the basis for most subsequent group tests, were as follows, with a sample of each:

Test 1. Following directions.

Example: "Attention! Look at 2, where the circles have numbers in them. When I say 'Go,' draw a line from Circle 1 to Circle 4 that will pass *below* Circle 2 and *above* Circle 3. Go!" (Allow not over 5 seconds.)

Test 2. Simple arithmetic problems.

Example: If you save $4 a month for 9 months, how much will you save? Answer (   )

Test 3. Practical or common-sense judgments.

(. . . "Make a cross in the square before the best answer.")

Example: Why are doctors useful? Because they
☐ understand human nature.
☐ always have pleasant dispositions.
☐ know more about diseases than others.

Test 4. Synonym—Antonym.

("If the two words of a pair mean the same or nearly the same, draw a line under same. If they mean the opposite or nearly the opposite, draw a line under opposite.")

Example: 4. contradict—corroborate . . . same—opposite

Test 5. Disarranged sentences.

(Indicate the truth or falsity of each statement when the words are in their correct order.)
Example: fuel wood are coal and for used . . . true—false

Test 6. Number series completion.

Example: 3 6 8 16 18 36 . . . .

Test 7. Analogies.

(Underline the word related in the same way to the third word that the second is to the first.)

Example: 36. order—confusion: peace—part, treaty, war, enemy

Test 8. General information.

(. . . "In each sentence draw a line under the one of these four words which makes the truest sentence.")

Example: 3. The *Percheron* is a kind of goat   horse   cow   sheep.

Other tests have been employed in group intelligence examinations: the digit-symbol, or symbol substitution, abstract logical relations, the interpretation of proverbs, and so on. Later tests have been improved by having all the directions with samples, called fore-exercises, given at first on the front page before the test is actually begun, which makes possible the self-administering plan whereby the subjects begin when the signal is given and keep going until they have done as much as they can or until the time is up. Improved means of scoring with stencils, carbon paper, and by the use of machines have reduced the routine labor involved in the many available group intelligence tests for all age levels.[19]

Uses of Intelligence Tests. The chief function of the intelligence test in schools is to classify pupils in such a way that they may be confronted with tasks that are sufficiently difficult, but yet within their general range of ability, so that they may be neither discouraged nor contemptuous. The many uses to which intelligence tests may be put are listed in Table 7, which presents a study of the practices of different cities.

Tests of achievement have also been devised, as described in Chapter IX, to determine more accurately the degree of skill or knowledge possessed by pupils in the different school subjects. These, too, have their part in aiding classification and instruction.

5. The Teacher and the Testing Program

Selecting Tests. While in the larger school systems all testing is handled by a central bureau under administrative direction, in many schools teachers have a part in deciding, either individually or through

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[19] These tests may usually be obtained from the measurement or research bureaus in the larger schools of education. The following organizations publish a great many tests:

American Council on Education, Washington, D. C.
Bureau of Publications, Teachers College, Columbia University, New York City
Public School Publishing Company, Bloomington, Illinois
C. H. Stoelting Company, Chicago, Illinois
World Book Company, Yonkers-on-Hudson, New York

TABLE 7 Purposes for Which Group Intelligence Tests Are Used in Public Schools in Cities Having a Population of 10,000 and More—215 Cities Reporting[20]

PURPOSES FOR WHICH TESTS ARE USED	ELEMENTARY SCHOOLS		JUNIOR HIGH SCHOOLS		HIGH SCHOOLS	
	PER CENT OF CITIES	RANK OF PURPOSE	PER CENT OF CITIES	RANK OF PURPOSE	PER CENT OF CITIES	RANK OF PURPOSE
Classification of pupils into homogeneous groups	64	1	56	1	41	1
Supplementing teachers' estimates of pupils' ability	62	2	44	2	33	2
Diagnosis of cause of failure	46	3	29	3	24	3
Establishment of classes for subnormal children	43	4	14	10	7	13
Extra promotions	40	5	21	4	8	11
Comparison with other school systems	26	6	18	7	13	7
Admission to first grade of elementary school	25	7	0	21	0	21
Placement of new pupils from other schools	23	8	19	6	10	10
Regular promotion of pupils	22	9	15	9	6	15
Determining comparative efficiency of classes	20	10	11	13	10	9
Establishment of classes for super-normal children	20	11	6	17	2	20
Diagnosis of cause of success	19	12	16	8	12	8
Demotions	17	13	8	16	7	12
Determining changes in method of presentation of lessons	14	14	13	11	6	15
Determining changes in subject-matter of courses of study	11	15	9	14	7	14
Determining class marks	10	16	7	19	4	18
Establishing special supervised study groups	8	17	6	17	3	19
Vocational guidance	0	—	13	12	17	6
Determining number of courses to be carried at one time by high school pupils	0	—	9	14	21	5
Guidance in the selection of high school course	0	—	19	5	24	4
Admission to organized school activities	0	—	3	20	5	17

[20] From W. S. Deffenbaugh, Use of Intelligence and Achievement Tests in 215 Cities. City School Leaflet No. 20. (March, 1925.) By permission of Office of Education, Washington.

committee or faculty action, what tests will be used. The considerations involved in test selection may be classified as practical and technical. The *practical considerations* relate to matters of cost in time and money. Individual tests are the most costly, though this fact should not be allowed to outweigh their other advantages. The longer the group test, the better measure it is, other things being equal, which fact must be balanced against the available school time for testing, and the clerical assistance for scoring. Machine scoring reduces the lag in obtaining results, but not all tests can be scored in this way, and relatively few school systems are equipped with machines; but machine-scoring forms may be scored very quickly by hand. To be considered likewise are the time and clerical help that may be devoted to handling the results, transferring scores to individual record cards where they may be used in individual guidance, and manipulating the data so that general conclusions may be drawn, in relation to other measures, concerning the nature of the school population. It sometimes happens that an overambitious testing program is as useless as a white elephant, since all available resources are used up in buying the tests and getting them administered, and nothing is left over to do anything with the results. *Technical considerations* in test selection relate to the evaluation of the tests themselves, their reliability, validity, and the nature of the populations from which the published norms were obtained. These criteria are discussed in the next chapter.

Administering Tests. While individual tests require special training, group tests can usually be administered by qualified teachers. If the matter is handled in this way, what may seem like excessive care must be taken to follow the standardized procedure, including giving the directions, timing, and refraining from giving any extra help. So accustomed are teachers to aiding pupils that some find it well-nigh impossible to resist the temptation in a formal testing situation. It is obvious that any irregularities in these matters reduce the value of the results, making an individual's score meaningless for comparative or diagnostic purposes. It sometimes falls to the teacher's lot to participate in scoring tests or tabulating results either directly or in a supervisory capacity. Here caution should be taken to avoid the ever present danger of clerical and computational errors. Sometimes a school testing program is utterly worthless because of mistakes in scoring, adding totals, tabulating results, or making simple statistical computations. Children have been classified in wrong sections, and comparisons with group norms have gone awry because these processes have not been adequately checked.

Interpreting Test Results. School policies differ over the question as to what should be done with the scores of pupils on standardized tests, particularly tests of intelligence. Some think the teachers should know, if anything, only the rough classification rating, such as superior, bright, average, dull, inferior, to which classifications letter designations are sometimes given (A, B, C, D, E). Others are of the opinion that they should know the mental ages and intelligence quotients. The main reason for keeping them in ignorance is that some teachers stupidly embarrass pupils by using the information to club or shame them into doing better work, or as an excuse for their not doing the work they should. If not tactfully used, such information can create unsatisfactory attitudes, a condition which is sometimes aggravated when parents get hold of the information. Another reason for not giving out intelligence scores is that they may vary considerably in some cases. A single score may therefore turn out to be incorrect, and should therefore be held tentatively and not permanently attached to a child. A later testing may give a somewhat different result. On the other hand, a wise teacher, one sufficiently well trained to interpret the IQ correctly, could presumably use it to lighten the demands when they become too heavy, to encourage when encouragement is needed, and in other ways to make his handling of the pupil much more intelligent.

Similarly, some think that the scores should be kept from the pupils in the belief that they will be unduly discouraged by a low score and unwisely complacent about a high one. Others, however, believe that children should know their IQ's so that they can use the information in making life decisions. It is obviously impossible to generalize in the matter. For example, a discouraged child should perhaps know that he is of normal or above-average intelligence; or a child whose ambitions exceed any reasonable expectations should probably be sympathetically shown that another vocational choice would be wiser for him in view of the findings of the tests. Such uses give support to the fairly common practice of giving the information to pupil advisers and leaving the use of it to their professional training and good judgment.

Pupil Counseling and Guidance. It is probable that children should know their intelligence level, but such knowledge consists of more than a bald statement of a numerical score, a letter grade, or even an adjective, whether uncomplimentary or gratifying. The meaning or significance of the score is the important thing, and this cannot be conveyed easily, especially since it relates to a great many other factors in a child's life. For example, an IQ of 88 may be described as "pretty nearly

average," "not quite average," and "not even average." Any score should be interpreted in relation to the prevailing intelligence of the group in which it is found. An IQ of 88 may be said to be very superior in an institution for the feebleminded, but it is below average in high school, where an IQ of 125 is superior. The latter, however, is probably below average in graduate school. Furthermore, any IQ from 70 up permits of a wide range of activities according to the other capacities of the individual. Hence, a good counselor would be expected to open up the possibilities for a pupil in the school program and in life work in terms not only of his IQ but of other capacities that may be developed.

With the increasing amount of professional training teachers are receiving, their guidance function is becoming more and more important. It is well recognized that the large numbers of pupils who are enrolled in secondary schools are not fitted for the narrow program of relatively advanced study of former days. The diversified curriculum demands that choices be made on the basis of what evidence can be brought to bear. In the smaller schools the individual teachers are primarily responsible, while in an increasing number of institutions special teachers devote part or full time to the guidance function. They share with school psychologists the direction of the testing and guidance program, the handling of the more difficult cases, and the provision for remedial work.

6. Administrative Adaptations to Intelligence Differences

The Single-Track System. The old, rigid type of grade organization of the school employed units of work and a system of yearly promotion which was fairly well adapted to the majority of pupils in attendance. If some played hooky, the school program was not held in any way responsible. Any sign of truancy on the part of the pupils was viewed as wrongdoing, and truant officers were employed to hold the erring to the path of light. The little red schoolhouse on the hill, which has figured in countless orations, furnished the tutelage of many a well-born patriot who deserved better treatment; and the less fortunate, who did not seek entrance into the learned professions, just dropped out. In a simple rural society there was perhaps no great harm in this; farm tasks were diverse and farm hands needed. But in a complex, industrial order the so-called democratic school ladder, to be climbed by all alike, hardly suffices. Those who slip between the rungs, long before they have climbed its full length to the university, its "crowning glory," receive a severe jolt. And they may well wonder if the exercise they got from climbing did them much good after all.

A democratic school system cannot conscientiously continue these abuses. But the attempt to adapt the school to pupils of widely differing abilities has encountered difficulties, and these have been met more or less satisfactorily in various ways. The differing amounts of native intelligence possessed by school children, as well as their differing vocational aptitudes and interests, suggest the desirability of some sort of selective grouping. Much progress has been made in this direction, but it has been made slowly and in the face of considerable opposition.

Heterogeneous Grouping—Advantages, and Disadvantages. In the larger schools, where it is possible to have more than one section of the same grade or course, such groups may be made up heterogeneously, that is, without regard to the abilities of pupils; or they may be homogeneous, in which case pupils of approximately the same abilities are in the same grade or class. Administrators sometimes find it more convenient to form sections in a random fashion or more or less alphabetically, owing to the difficulties of program construction, instead of grouping children according to their abilities.

Another advantage of heterogeneous grouping is that the superior pupils help the progress of the class along. When a homogeneous grouping system is employed, some teachers of lower-ability groups complain because they miss the understanding nods and ready recitations of the bright. "You have taken away our best pupils," they say, not realizing that their instruction had been aimed too high for the majority to profit by it. The same argument is sometimes stated from the pupils' point of view, that it is unfair to the slow students to be deprived of the inspiring example of the bright. But a really dull person rarely makes this contention, for such a one knows too well that the practice of the "pacemaker theory," as it is called, results in discouragement more commonly than in inspiration.

Then there are those who feel that the heterogeneous group is more democratic, and hence more desirable. But such people are usually ignorant of the wide range of abilities to be found in any school grade. If it is considered advantageous for children of different intelligence levels to mingle, arrangements need to be made so that they will have different tasks in harmony with their differing abilities without forcing them to compete intellectually. There is nothing undemocratic about a handicap tournament in golf, tennis, or track; no more is there in putting pupils into intellectual situations in which they have a reasonable chance to succeed.

The disadvantages of the heterogeneous grouping are threefold. In

the first place, it does an injustice to the backward, who cannot keep up with the brighter children and so may become discouraged. This fact is recognized by those schools which keep a child in the same grade no more than two years. Sometimes, of course, pupils are promoted on the basis of their work in certain subjects, though they have failed to qualify in others. In either case, they do not have the ability to do the work of the next grade. Hence it happens that backward children are actually "accelerated" in school; that is, placed one or more grades ahead of where they should be as judged by their capacity for doing work. Frustrated, then, by their inability, they have reason to be discouraged, and they form habits of failure which spell the end of effort. They are almost forced to seek antisocial ways of gaining the recognition they crave, which often gives rise to serious disciplinary situations. Hence, from the school they are compelled to attend they not only fail to acquire the ability to satisfy their basic needs, but they are forced into an inferior minority group, and through no fault of their own are censured for failures in tasks for which they are not by nature fitted.

Heterogeneous grouping, likewise, works an injustice to the bright. They are held back by the educational lockstep of one grade a year with the result that they are usually located 'from one to four grades below where they might be on the basis of their abilities. Thus, in relation to their intellectual ability, they are actually retarded. While the teacher is going over the work again for the benefit of the less gifted, the brighter pupils must either waste time doing nothing and so form habits of sloth, or think up something to occupy themselves, which may be more amusing to them than to the teacher. Aside from the disciplinary situations which are thus apt to arise, another disadvantage is that the bright children are likely to become snobbish, because they are the ones that always know the answers, or are always right, or can get high marks without working.

In the third place, heterogeneous grouping works an injustice to the teacher. He can try to keep the whole class together, which means aiming at the average, proceeding too slowly to keep the attention of the superior, and too rapidly for the dull to know what is going on. Or he may gear his instruction down to the abilities of the slow and try to furnish some incidental amusement of a harmless sort to the rest. Or he may work with and inspire the more brilliant and leave the majority out in the cold.

In spite of all this, the difficulties which confront a teacher in attempting to handle a heterogeneous group of children have been met more

or less satisfactorily by able teachers. The brighter have been allowed to do additional reading, or to furnish assistance to the others, or to help with certain routine classroom duties. Some have gone further and have themselves divided the class into two groups, setting one group to work while they instruct the other. Also, teachers and administrators have arranged to have bright pupils skip a grade. Even if the pupil's loss of the work of the grade skipped is not considered irreparable, he is apt to have some difficulty in adjusting to a new group of older pupils. Valuable as these efforts may have been in individual cases, they are too few and too sporadic to be considered a solution.

Homogeneous Grouping Methods. Various administrative schemes were devised during the latter part of the past century to group pupils of like ability together and enable them to progress at their normal rate. One scheme that was tried to facilitate acceleration—i.e., to hasten the progress of the more able through the schools—and to avoid the disadvantages of skipping a whole grade was to organize quarter-year terms which permitted special promotions. Another provided for sections of fast-, average-, and slow-learning pupils in each grade—the beginning of ability grouping. A third inaugurated three courses from grades four to nine inclusive, one of four years, and one of five, besides the usual one of six, with provision for transfer between them. Various modifications of one or more of these plans are still used.

Efforts have been made, not only to adapt the speed at which pupils are forced to cover a certain amount of work to their abilities, but also to modify the curriculum as well by providing what has been termed "enrichment" for the superior. Qualitative adaptations with this aim have been made possible chiefly through departmentalized organization. Thus, in any one subject a pupil may do more or fewer examples, read more or fewer books or outside references; or he may elect more or fewer courses, according to his ability. Also, various extracurricular activities take up time that is not needed for regular school work, as do private lessons in dancing or music.

Since the pupils of low intelligence attracted the most attention because they didn't get through the standard course of study with the mechanical regularity so much sought, *special classes* in the public schools in this country were first organized for them. Ungraded classes were made up not only of those who were slow mentally but also of problem children of various sorts, for teachers gladly nominated their troublesome cases, whatever their intelligence. Efforts were later made to correct this condition by means of intelligence scores, which were

used as criteria along with teachers' judgments. Some classes were set up under the euphemistic name of "opportunity room," which meant that special assistance would be given to failures and to those who had been out of school through illness or other çauses, giving them the opportunity to make up the work they had missed and thus get back into the regular grade. In some cases this works rather well, while in others it is a futile gesture, since many of the "opportunity" pupils are slow of mind, and, in spite of this, they are forced to double duty trying to keep up with the regular class and to make up back work besides. Since no provision is made in this way for the superior, the opportunity room has tended to become a special class, or has been fitted into a system of ability grouping.

Many school systems employ some form of *ability grouping*, usually on a three-group basis, called variously A, B, and C; or X, Y, and Z, as well as other things. Normally, the upper 20 to 25 per cent of the children constitute the first, or A, group; the middle 50 or 60 per cent, the B group; and the lower 20 to 25 per cent, the C group. Segregation is made chiefly on the basis of intelligence, though such other criteria as the following have been listed: [21]

1. Chronological age, or the length of time the child has lived.
2. Pedagogical age, or the degree of advancement in school as shown by the grade he is in or by age norms derived from performance tests in different school subjects.
3. Anatomical age, or the stage of bodily development as shown variously by the onset of pubescence, height and weight, progress of dentition, and X-ray photographs of wrist bones revealing their stage of ossification.
4. Social age, or extent of social development.
5. General condition of health.
6. Rank in class, or school marks in relation to those of classmates.

Supposed Mental Differences of Bright and Dull Pupils. A number of attempts have been made to describe the differences in the mental activities of bright and dull pupils. For example, it has been said that the bright are better at understanding abstract instruction, and at generalizing and applying generalizations; while the dull need concrete demonstrations and specific rules to follow, and have difficulty in making applications. Such differences are undoubtedly found in the usual school-

[21] From H. H. Ryan and P. Crecelius, *Ability Grouping in the Junior High School*, New York: Harcourt, Brace, 1927. By permission.

room. The teacher will have in a class pupils who are bright and can generalize, and pupils who are dull and can't. This much is true.

Nevertheless, there is a very grave fallacy in such a view. Such pupils are being compared because they happen to be in the same class, or because they are of approximately the same chronological age. The disabilities ascribed to the backward pupils are in reality those that would be expected in children who are called upon to do work that is above their level of comprehension. And, on the other hand, the abilities ascribed to the bright are those one would expect of those pupils who are doing work that is beneath them in point of difficulty. If, instead of comparing the behavior of these two groups in the face of the same task, brighter junior-high-school groups were faced with subject matter on the twelfth-grade level, and slow junior-high-school groups with tasks normal for the second grade, it is probable that many of the so-called characteristics of the two groups would be reversed.

A somewhat common misapprehension is abroad that the backward child has been the first to receive special attention at the hands of the school, and that the superior child has been relatively neglected. For example, a recognized authority in the field of the education of exceptional children has written: "In the education of gifted children we are facing a new problem. . . . We spent thirty years getting to the point where we recognized that the gifted child was worth considering at all." This misapprehension has probably been due to the fact that special classes for the backward in American mass education preceded special classes for the superior. As a matter of fact, it is only since the democratic and humanitarian movements got well under way that the backward received any education at all. In the early days in this country the masses of children who are now a matter of concern to psychologists and educators were at best given a common school education largely designed for the intellectually élite, who would follow a formal secondary-school course preparing them for training in one of the learned professions. The curricula were planned by superior minds for superior children. The humanities, as taught, have proved to be rather indigestible for those of average or inferior intelligence, but they constituted a fairly satisfactory curriculum for some of the gifted few.

Individualized Instruction. Even when a system of ability grouping is used, it is found that the children in any one group are far from being homogeneous, differing as they do in intelligence and special abilities, as well as in interests and enthusiasms. The ideal system would seem to be one in which each child works at his own rate.

A number of schemes have been developed to instruct children individually in groups. What is required is a set of self-instructional, self-testing materials which somewhat resemble those of a correspondence course. The pupil works through these at his own rate of speed, checks his answers, and asks the teacher for help when he needs it. If he is out of school for any reason, he has no work to make up when he returns; he merely begins where he left off. Because assignments differ for children of differing abilities, there is no such thing as failure. The teacher's duties are to maintain an atmosphere conducive to study, explain details of assignments, give out information about equipment, and offer special help either to individuals or to small informal groups of pupils who have encountered the same difficulty.

There are two chief disadvantages to any plan of individualized instruction. One is that instructional materials are cumbersome and not always sufficiently flexible either in content or difficulty. The second is that it is a subject-centered organization rather than one that brings the pupil into the social life of the school. However, it may be supplemented by group activities—play, dramatics, music, and excursions—which provide opportunities for self-expression and for experience in community living.

Group Projects. A final form of adaptation to individual differences in intelligence is difficult to trace historically, but it is commonly identified with the progressive education movement. It has been more or less successfully employed in elementary school grades, but only here and there on an experimental basis in secondary schools. It involves the cooperative action of the whole group in planning an activity and carrying it through to completion. Varying degrees of suggestion and stimulation are provided by the teacher who in the rôle of leader is one of the group. The procedure is based on the theory that children will energetically carry forward a plan of their own, and that only experience so gained is truly educative. The theory provides, further, that they will reach out into the environment to satisfy their intellectual needs. And if the environment is intellectually stimulating, they will learn. Those of lower mentality will participate at their level, and all will gain the advantages of socialized activity—learning to get on with others.

It is contended by the proponents of this plan, and on the basis of considerable objective evidence, that children learn the fundamentals, i.e., reading, writing, arithmetic, and spelling, as rapidly and as effectively in this way as they do by the more traditional methods. It is further contended that those who do not learn as rapidly as might be desired

are proceeding as satisfactorily as their rate of development permits, and that any additional forcing is not only ineffective, but tends to develop conflicts which interfere with optimum progress.

Whatever plan or combination of plans is adopted by any school, one may be sure that there will be both satisfactory and unsatisfactory features. Any procedure is necessarily a compromise between two desirable but mutually exclusive objectives: the provision for the most satisfactory individual intellectual progress for each child, and the setting-up of experiences by means of which he may develop socially and become a well adjusted member of his group.

7. Educating the Exceptional Child

The Feeble-minded. While children whose IQ is below 70, and who are therefore usually classed as feeble-minded, are not supposed to be taken care of in the regular public school system, many high-grade feeble-minded, or morons, are to be found in the elementary schools. Institutional care is necessary for the-lower levels of feeble-mindedness, and usually for the upper levels, too, during their childhood years until they can be trained in the ways of social living and in the routine skills which will enable them to support themselves.

It has long been supposed that the conditions producing feeble-mindedness are hereditary, but, though the mentality of the parents is an influential factor in great numbers of cases, estimated at from 50 to 90 per cent, other conditions are often responsible for mental retardation. Cretinism, or childhood myxedema, is caused by thyroid deficiency as has been shown. The cause of mongolianism, another clinical form of feeble-mindedness, is not yet known, but it appears in families where there are normal children. Microcephaly occurs when the fontanels of the skull close prematurely, though the cause of this is obscure. Macrocephaly, due to hydrocephalis or "water on the brain," occurs when the cerebrospinal fluid is produced in excessive quantity. All such clinical types are idiots or imbeciles. One or another of the many forms of encephalitis, or "brain fever," is responsible for many cases of mental retardation, even when the disease itself is not particularly severe, while other causes of brain injury, such as falls and the like, may be responsible. Investigations have also shown that anoxia or oxygen deprivation as a result of excessive use of drugs to alleviate pain at child birth, especially in cases of prolonged labor, has produced feeble-mindedness in many a child who otherwise would have been perfectly normal. The brain-injured, or *exogenous* feeble-minded, as they are called, may be differentiated from the hereditary, or *endogenous*, type by psychological,

diagnostic techniques. They require special training which, though slow and painstaking, sometimes results in marked gains in ability.

The Dull Normal. It is possible to become quite pessimistic in the face of the task of properly educating the backward or dull normal whose IQ range is from 70 to 90. This is so especially if one has the over-sentimental attitude of some amateurs in social work and feels that each such individual should have the virtues of the Scout Code, should be grateful for what is done for him, and should respond by suddenly becoming twice as bright as he was made. Some of the disappointing features are these: (1) Only a very limited improvement is usually possible. (2) The backward, like other people, are subject to various weaknesses that flesh is heir to: emotional disturbances, delinquent tendencies, and the rest, sometimes aggravated by their low mentality. (3) Their home conditions, cleanliness, social morality, and the like, are not always what could be desired, and the instability of the population, in some cases, makes any consistent treatment almost impossible. In the congested regions of our big cities, it is no uncommon thing for a teacher's classbook to have on it at the end of the year only a half or a third of the names with which the year began. The rest are crossed out because their owners have migrated elsewhere, and others have taken their places. (4) They exhibit a magnificent lack of enthusiasm for the academic trivialities with which conscientious teachers have bravely tried to make a permanent trace in their nervous systems. (5) Even when they have learned to write awkwardly and to figure inaccurately, they seldom have recourse to these arts; and, if they attain success in reading, the comics and the tabloid news sheet are likely to be their highest literary aspiration.

And yet these children will become citizens with the right of suffrage; they experience the joys and sorrows common to humanity. They become, somehow, a part—and a most useful part—of our body politic. The school has therefore conscientiously set about the task of making the years they are within its portals as profitable as may be, for the sake of their own happiness and for the welfare of the social order as a whole. To this end it is making revolutionary changes in its whole outlook and practice. (1) Reading and the other academic subjects are utilized as far as possible, though the distinction between the comma and the semicolon is considered of less importance than individual and community hygiene. (2) Shops are equipped, not only to furnish opportunity for the acquisition of useful skills, but also to serve as a trying-out place where aptitudes and interests may be discovered, to aid in more effective

vocational guidance. And a modicum of real trade training is furnished along with a less formal type of academic and citizenship instruction from which thousands can derive genuine profit. Furthermore, the school provides worth-while social activities and companionship for children who are thus better adjusted to life and better able to get along with each other than they would be if they roamed the streets or were exploited as child labor—the probable alternatives.

Even some of the feeble-minded who were earlier thought to be institutional cases can be trained to do various kinds of unskilled labor, to be regular on the job, and to work industriously. A more adequate vocational guidance and follow-up system, together with opportunities to acquire definite training for specific jobs when the need arises, would probably help even more to eliminate the maladjustments at these levels of intelligence.

The Superior Child. The enactment of compulsory education laws, which has brought large numbers of less intelligent children into the schools, has resulted in considerable injustice to the intellectually superior children with IQ's ranging from 130 on up to 200. One of these unfortunate results is the educational lockstep, to which reference has already been made. Children who could easily cover a certain amount of work in three or four months are compelled to dally with it for a year. Minimum essentials at the rate they are usually covered present little to challenge a superior mind. Furthermore, many superior children are not stimulated to do what they might, since with little or no effort they can do well enough, and to do better would tend to make them less acceptable to their fellows.

Another unfortunate result is the rather widespread belief that the mentally superior are inferior in the physical, emotional, and social aspects of their personality. Perhaps to rationalize their children's low school marks, parents have remarked, "Well, I wouldn't want to have a genius in the family." Recent studies have confirmed the conclusions of Terman and his assistants, obtained from an intensive study of 1444 gifted children:

In physical growth and in general health the gifted group unquestionably rates on the whole somewhat above par. There is no shred of evidence to support the widespread opinion that typically the intellectually precocious child is weak, undersized or nervously unstable. . . . The "onesidedness" of precocious children is mythical. . . . The common opinion that intellectually superior children are characterized by a deficiency of play interests has been shown to be wholly un-

founded. . . . Our gifted surpass unselected children in tests of honesty, trustworthiness, and similar moral traits. . . . A modification of Woodworth's test of psychotic tendencies showed approximately 75 per cent of the gifted above the average of unselected children.[22]

Clearly, the "common-sense" opinion concerning the muscular or nervous inferiority of the intellectually superior is based on some single dramatic case, or at least on too few cases to be worth anything. Of course, as Terman pointed out,

One could find in the gifted group numerous exceptions to the general rule with respect to character, personality, and emotional stability. The gifted are not free from faults, and at least one out of five has more of them than the average child of the general population. Perhaps one out of twenty presents a more or less serious problem in one or another respect.[23]

These conclusions are in line with those of other studies which have been made. In general, these have shown that, with the exception of the characteristics which make them intellectually superior to others of their age, such as ability to learn with less drill, intellectual curiosity, and the ability to generalize on higher levels, the superior children are very much like the others. And the educational adaptations which have been made are merely to fit the curriculum to this level. Many of such reorganizations, which consist chiefly of the introduction of the problem-project or the activities technique, are equally appropriate for children of other intelligence levels, even the lowest in the school.

Various methods have been employed for the discovery in the population at large of those of superior intellectual endowment. In many ancient countries, as well as in those of medieval Europe, this selection was on the basis of birth. A nobility deriving from earlier military or commercial successes constituted the aristocracy, to whom alone the benefits of education were extended. Of course many fools were thus decorated from time to time; but, owing to new wars or new trade routes or new industries, there were constant infusions of new blood.

China—and, much later, Western Europe and the United States —evolved systems of examinations which admitted the successful can-

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[22] L. M. Terman and others, *Genetic Studies of Genius*. Stanford University: Stanford University Press. Vol. I, *Mental and Physical Traits of a Thousand Gifted Children*, 1925; Vol. II, Catherine Cox, *The Early Mental Traits of 300 Geniuses*, 1926; and Vol. III, Barbara Burks, *The Promise of Youth, Follow-up Studies of 1000 Gifted Children*, 1930.

[23] *Ibid.,* Vol. I, p. 638.

didates to one or another kind of preferment. These have long been used in the school at varying levels and have served not only as a means of testing knowledge, but as a basis for the selection of those of superior mentality as well. Their success in rapidly hurdling these obstacles is shown by Terman, who discovered that the surest simple way to find the brightest child in a class is to pick the youngest. Errors in this rough-and-ready technique can be corrected by the more refined instruments which have been described.

When the superior children are once selected, the experiment must needs continue. For, as shown by the wide diversity of suggestions, no one knows just how they should be educated. Clearly, the practice of furnishing them teachers beneath them in social and intellectual develop-ment should be discontinued. The inadequacy of such teachers, while not always recognized by the principal, comes out clearly enough in confidential conferences and in diary entries.

The rigid formal training in Greek, Latin, and mathematics which generally maintained until a couple of generations ago is now discoun-tenanced, chiefly on the basis of two contentions. One is that the knowl-edge of the world furnished by such disciplines is so lacking in breadth as to make the scholar narrow, bigoted, pedantic, and out of touch with a civilization where scientific knowledge and social insight play such an important part. The other is that the child mind, instead of being forced to travel entirely within the formal curricular grooves, much of the time should be allowed to roam the universe at will, directed by its own interest and enthusiasm. Only as it is free from compulsion, it is con-tended, will it apply itself whole-heartedly, and hence profitably, to worth-while tasks.

Perhaps the most annoying dilemma in the education of the superior child presents itself in the following form: Should he travel through the work of the school at the speed that he is able to maintain until he finds himself with those far more mature, physically and socially, or should he trundle along at the common rate, indulging in various forms of "enrichment," such as extra-curricular activities and wide reading, but grouped for his school work with those below his mental level? As the schools are now organized, there is no way out but compromise. (1) He may be promoted more rapidly than the others but not allowed to get so far ahead as to be unhappy in the companionship of his schoolmates; arrangements may even be made for him to participate in social activi-ties in the group which is most like him in social development. But this lands him as a freshman in college much younger than his classmates, which may result in maladaptation and unhappiness. An intermediate

year or two between high school and college breaks up the continuity of work, and may be less profitable than one spent later in the practice of his chosen profession. (2) Or, if he is promoted annually with his group, tasks and opportunities may be provided in harmony with his abilities. He might be in the sixth grade but doing the equivalent of ninth-grade work, at least in some subject-matter areas. But this calls for individualized instruction and enriched facilities which many schools cannot now provide.

The Child with Special Talents. The child of superior intelligence is one who may be said to have a special talent for the kind of endeavor that is emphasized in schools. But, wherever an individual may stand in the range of intelligence, whether among the great majority who cluster around the average, or among the smaller numbers above and below, he may have some special abilities or talents, great or small, which may not be very closely related to general intelligence.[24] These may be mechanical or artistic skills of one sort or another, or qualities of leadership. They may not be of a level to place him eventually in a position of pre-eminence, or they may. In any case, cultivation of the talent is likely to add to his adjustment and satisfaction in life as well as to the service he can render or the enjoyment he can give to others. It is one of the tasks of the school to discover such talents and to provide the opportunities for their development.

8. INTELLIGENCE AND GROUP DIFFERENCES

Deprived Groups. One final question concerning individual differences in intelligence calls for consideration. Every teacher has in his classes representatives, if not random samplings, of different groups, and he is inclined to make judgments about individuals on the basis of their group membership. There are those who come from poor environmental conditions, for example, race and nationality groups, representatives of different sex and personality categories, and those who classify in one way or another occupationally. Can one make any kind of judgment about the intelligence of individual members of these groups on the basis of their group membership? Is the average for them higher or lower than the general average, and how do the ranges of intelligence compare?

The influence of environmental conditions on measured intelligence has been investigated in various ways. Orphanage children have been

[24] W. C. Trow, "Who Are the Gifted?" *University of Michigan School of Education Bulletin,* vol. 13 (October, 1941), 8–11.

reported to have lower IQ's than otherwise comparable groups, and nursery-school children higher.[25] The socio-economic status of the family, as measured by parental education and the status of the father's occupation, has been found to bear a positive relation to the intelligence test scores of the children. The IQ's of children from professional groups average consistently around 115; and, though above-average intelligence is most frequent in the professional class in relation to its size, the majority of gifted and superior children come from nonprofessional classes and from families of modest income. Even the studies of so-called "isolated groups," such as those of the canal-boat children in England,[26] the mountain children,[27] and the folk of Colvin Hollow,[28] reveal that cultural and educational backwardness is as much a result as it is a cause of the low intelligence found in these population groups. In answer to the very pertinent question, "Why were they so deprived?", it has been pointed out that schools and colleges were not found in the wilderness by the early settlers but were established by them.[29] In general, it would seem that intelligent people establish schools of one sort or another for their children. The children, therefore, have the advantage both of better organic potentialities and of more favorable opportunities, and they score higher on intelligence tests than those who are deprived of both. On the other hand, since deprivation is such an important factor in test as well as in school performance, children from isolated culture groups may be expected to score lower and to be handicapped educationally especially at first. But with educational opportunity they will improve, some of them markedly.

Racial and Nationality Groups. Similar difficulties confront the investigator who seeks to discover whether there are differences in the intelli-

[25] Beth Wellman and others, "A Study of Environmental Stimulation; An Orphanage Preschool Project," *University of Iowa Studies in Child Welfare*, vol. 15, No. 4, 1938; Marie Skodak, "Children in Foster Homes, A Study of Mental Development," *University of Iowa Studies in Child Welfare*, vol. 16, No. 1, 1939; George D. Stoddard, "What the Kindergarten and Nursery School Have in Store for the Child," *Bulletin of State University of Iowa*, New Series No. 694, July 1, 1933 (*Child Welfare Pamphlet* No. 17). The results and environmentalist viewpoint of the Iowa studies are presented by George D. Stoddard in *The Meaning of Intelligence*, New York: Macmillan, 1943.

[26] H. Gordon, *Mental and Scholastic Tests among Retarded Children: An Inquiry into the Effects of Schooling on the Various Tests* (*Educational Pamphlets*, No. 44), London: Board of Education, 1923.

[27] M. Sherman and C. B. Key, "The Intelligence of Isolated Mountain Children," *Child Development*, vol. 3 (December, 1932), 279–290.

[28] M. Sherman and T. R. Henry, *Hollow Folk*, New York: Crowell, 1933.

[29] *Thirty-ninth Yearbook of the National Society for the Study of Education*, 1940, Part I, pp. 329–330, in the chapter entitled, "New Evidence on Environmental Influence on Intelligence," by Florence Goodenough.

gence of different races and nationalities. If such differences are found, they would be of greater significance, perhaps, if it can be shown that they are due to organic and not to cultural causes; this has not been done. In addition, two further difficulties present themselves—the determination of what constitutes membership in a race, as distinct from a nationality or a culture, and the problem of securing a sampling of the race or nationality that is representative of the group as a whole.

The groups which have been tested in this country are not necessarily fair samples since they and their forebears came here for different reasons and under varying circumstances. What can be studied are various so-called *census groups*, in which the racial (or national) origins are sufficiently obvious to make them clearly recognizable by those acquainted with them. Members of many such groups, especially the children, have been measured largely on a random basis of selection and without much attention to relative cultural advantages, with such results as the following: The average intelligence scores of Negroes, American Indians, Sicilians (Southern Italians), and Mexicans are uniformly lower than the averages of native-born American children generally. Similarly, the average scores of North European stock, Jews, Japanese, and Chinese are virtually the same as those of native-born American children.

It should be emphasized, however, that this applies to average scores only, and that the range of intelligence scores is practically the same for all groups—from idiocy to genius. To take a case in point, a group of superior Negro children in Chicago showed an IQ range from 120 to 200, and it was found that in "home background, developmental history, school progress, educational achievement, and social and personal traits, they resemble other groups of American children who are superior in test intelligence."[30] Similarly, groups of fifty children from each of five Oklahoma Indian tribes in reservation schools averaged from 84 to 96 IQ, while three Choctaws and one Cherokee tested at or above 140 IQ.

Among the reservation Indians it would be supposed that educational opportunities would be fairly similar. Tests of Negro children, however, show that in the North the average IQ is around 87, while in the South it is around 80. Here again it is impossible to say whether the difference is due to the superior educational advantages presumably available for Negroes in the North, a closer relation between test items and experience in the northern states, or to the superiority of the stock of those who earlier migrated North in the expectation of improving

[30] P. Witty, "Research upon the American Negro," *Thirty-ninth Yearbook of the National Society for the Study of Education*, 1940, Part I, 261–267. Report of a doctoral dissertation by M. D. Jenkins.

their condition. Another minority group, the Chinese and Japanese in California, in spite of a similar racial prejudice, and in spite of the disadvantages of bilingualism, show test scores equal to those of white American children. It cannot be said whether organic or cultural factors are responsible. However, the high correlations obtained between intelligence and amount of schooling among all groups points definitely to the cultural factors, supplemented by matters of selection, and by traditional attitudes toward education, intellectual values, and the importance of individual initiative and enterprise.

Sex Differences in Intelligence. There are fairly well-established stereotypes of masculinity and feminity[31] but these categories do not always follow sex lines. Effeminate men and masculine types of women are fairly easily recognized, though the averages for men and for women are of course widely divergent. Physical differences between the sexes, such as those in height and weight, have been measured, as has been shown in connection with rates of growth, and personality inventory questionnaires give differing average results. But in the realm of mental abilities no such divergencies are found. Such slight intelligence differences between boys and girls as group averages for each may reveal can be accounted for on the basis of differences in the selection of the sample of the cases tested. There is a little evidence, however, that the spread of intelligence is very slightly greater for males than for females. The male distribution runs higher and lower, or, putting it in another way, there are a few more male geniuses and male idiots. But for practical school purposes there is no difference in intelligence as measured between boys and girls.

Intelligence Differences and Personality. A person who deviates markedly from others tends to become isolated from the group. He may be physically handicapped, or "queer," in some way, so that he is left alone; and this very isolation tends to produce an effect on his personality. Extremes of intelligence can act in the same way to produce isolates. Many feebleminded persons, with IQ's below 70, are taken care of in separate institutions. Such treatment is not necessary for those with high IQ's because they can take care of themselves, but in some cases they tend to be shut off from those who have more nearly average intelligence. An extremely bright younger student, one with an IQ of 160 or above, in school or college, unless he finds friends who are like-minded, is apt to be thus isolated from his class-

[31] L. M. Terman and C. C. Miles, *Sex and Personality: Studies in Masculinity and Feminity*, New York: McGraw-Hill, 1936.

mates; and when he begins to feel the effect of the deviation, it is likely to influence the development of his personality.

The same is true for adult groups. The superior deviate may develop antagonistic attitudes toward authority that may appeal to him as stupid and unenlightened; he may become intolerant of others unless he has learned to "suffer fools gladly"; he may decide to take advantage of their stupidity, to cheat them, or to control them in order to satisfy his own ends; or he may immure himself in his laboratory or some other ivory tower and either intensify his own isolation, or, what is more common, become a member of a more extended community of scholars or scientists through his writings and research.

A range of "optimum intelligence" for social interaction has been suggested that lies between 130 and 150 IQ:

Within this range, the person comprehends more clearly, but not too much more clearly, than the majority of his fellowmen, and can thus get himself accepted as a supervisor and leader of human affairs generally, with accompanying emoluments and privileges. His vocabulary, his interests, and his hopes have at this point still enough in common with his contemporaries to enable and warrant cooperation. Beyond this range, however, mutual rejection begins to appear between the deviate and nearly all his contemporaries.[32]

It should perhaps be added that within any functioning group the situation is relative, that one with an average IQ may develop the symptoms of the isolate among his inferiors. On the other hand, the person with the higher IQ, as suggested earlier, through the process of social learning can develop the ability to get on with his intellectual inferiors and be accepted by them as an equal and as a leader.

Intelligence bears a relation to other aspects of personality as well. Ethical discrimination, social intelligence, and moral judgment, since thinking and general information are important in all, show a definite positive relationship to intelligence; the same is true of various attitude and interest tests. Effective intelligence, however, is dependent on various organic factors which influence motivation. Low BMR (basal metabolic rate) has been found the characteristic of depressed and apathetic states among psychotic patients studied; conversely, high BMR is characteristic of manic, agitated, and elated states. Correlations as high as .70 have been found between the metabolic rate and

[32] L. S. Hollingworth, "Intelligence as an Element in Personality," *Thirty-ninth Yearbook of the National Society for the Study of Education,* 1940, Part I, pp. 271–275.

intelligence of school children. The dynamic drive of the hyperthyroid case is well substantiated, as contrasted with the lowered energy of the hypothyroid. These conditions would be reflected on intelligence tests, but still more, no doubt, in the performance of the day-to-day tasks of the school.

The relation of intelligence to *emotional responses* and their inhibition has frequently been remarked on. In the intelligence test situation it is assumed that the individual is well motivated. Without sufficient motivation, he will simply not try very hard to answer the questions. Frustration has been shown to give rise to emotional responses, and, if not too strong, to renewed effort, since the total personality becomes involved. If the frustration is too strong, resulting in a kind of despair, the constructive effort involved becomes less; the individual appears to act less intelligently.[33]

The relation of intelligence to *delinquency* has been the subject of numerous studies. It has been found, for example, that from 10 to 30 per cent of the delinquent are feebleminded (below 70 IQ), and that their intelligence as tested averages about 85 IQ. However, there are a number of sources of error which make it impossible to draw the conclusion from such data that low intelligence is a *cause* of delinquency. One is the difficulty of securing rapport with the delinquent, who is usually tested in connection with the arrest or commitment. Another is the problem of sampling: Shall all children haled into court be called delinquents whether guilty or not? Or shall *only* those who are committed to an institution be so designated? Obviously, the first is an unfair criterion, and the second is extremely variable, since the treatment depends so much on the availability of institutional space and on the local policy at the time, coupled with the advisability of other methods of treatment. While it might be assumed that the delinquent is the one who is too stupid to use good judgment, tests of ethical discrimination show results not reliably different from those obtained from equivalent, nondelinquent groups; and there is apparently no relationship between intelligence and the seriousness of the crime. Also it might be assumed that the delinquent is the one who is stupid enough to get caught; yet the intelligence of delinquents, though below the "average," is about the same as that of the groups from which they come. Hence all that can be said with any real assurance is that delinquency and low intelligence are found more frequently among the inferior socio-economic groups than among other groups.

[33] K. Lewin, "Intelligence and Motivation," *Thirty-ninth Yearbook of the National Society for the Study of Education,* 1940, Part I, pp. 297–302.

Intelligence and Vocational Aptitude. Few problems with which the school has to deal are more important for the individual than that of vocational choice. Guidance programs, besides helping pupils in individual adjustment and in the selection of their educational experiences, assist them to find the kind of work they can enter most advantageously. Such help is properly based on a study of their peculiar interests and abilities and the available occupational openings. Sometimes, however, children are encouraged to prepare for work for which they are not fitted either by nature or by training, and to hope for kinds of employment which they will never be able to obtain. Hence many become dissatisfied and discouraged, until a difficult period of readjustment is passed.

A large number of factors besides native intelligence are important in occupational success. Among these are special aptitudes, education —both general and technical—interests, and personality characteristics such as temperamental fitness for the job, social adaptability, aggressiveness, cheerfulness, and dependability. As was pointed out in the first part of this volume in connection with the discussion of the qualifications for success in teaching, an individual may rank high in all except one of such characteristics as these and still fail. Hence, it cannot be said that any one of them is more important than the others, since weakness in any one may cause failure. And yet it is more or less generally assumed that an individual can, by training and determination, bring up any of the characteristics in which he is weak to the necessary level of acceptability—except intelligence. If his IQ is 50, he will never be an electrician, for example; and if his IQ is 100, he will never be a doctor. And a person's IQ may be too high as well as too low for success and for job satisfaction. The representatives of any vocation, however, exhibit a wide range of intelligence, since one may compensate for deficiencies of one sort with other points of excellence. However, occupations do differ in complexity, and the average intelligence of different occupational groupings from professional to unskilled labor show reliable differences.

Intelligence Differences and Teaching. The differences in intelligence among teachers are very wide, and are not always correlated with teaching success, as was pointed out earlier. The chief importance of the problems of intelligence, so far as the teacher is concerned, relates to the intelligence of pupils, to their capacity to learn, and to the consequent problems of pupil grouping, instructional method, curricular content, and educational objectives. Under prevailing methods

of mass education, no procedures can be perfect, and compromise is necessary. But that school is dealing with the problem most successfully in which the great majority of pupils are working together with a reasonable degree of enthusiasm up to their level of ability, and in which special arrangements are made for the deviates at both ends of the scale in order that they may be enabled to profit as much as they can from their school experiences.

In Summary

The intelligence differences found among school children are so important in determining the appropriate curricular activities and methods to employ, and measuring intelligence is such a usual school procedure, that it is important for teachers to be informed as to what is known about them and as to the uses intelligence tests can reliably serve. Though the term intelligence is a common one, the concept is quite abstract, referring as it does to the quality of certain kinds of responses made in the process of adjusting, learning, and thinking.

The long history of the formation of the measuring instrument by Binet and others, with the development of the scale, the MA and IQ units, and the group forms, illustrates the processes of research in educational psychology at their best; it also leads one to appreciate the lack of finality in such work. The instrument in use at any one time may be the best available, but the results of its use may not be so exact and perfect as they seem. One needs to know about such an instrument as well as how to use it if results are to be interpreted in a way that will be most helpful to the pupils.

Merely knowing children's intelligence levels still leaves unsolved the problem of what to do with this knowledge. Even homogeneous grouping on the basis of intelligence scores classifies together those whose abilities differ widely, owing to other native factors and to developmental background.

Various administrative schemes have been devised whereby all work at the same tasks together, smaller groups work at the same task together, pupils work individually, and all work at different tasks that are parts of a common project. However, in any system of mass education, the pupils on either side of the middle range of the intelligence scale present the greatest difficulties in classification. The feebleminded can usually be handled best by some plan of partial or complete segregation; the dull normal, who are usually not segregated, are under constant pressure in a graded school system since they do not often have a program suited to their capacities; the superior usually handle the regular program well

enough if given a chance and largely take care of themselves through participation in additional activities.

Representatives of certain special groups, by virtue of that fact, are sometimes thought to be endowed with low (or high) intelligence. The average and the range of intelligence of such groups, however, are found to be about the same as for the population at large except as some selective, environmental factor is operating. In deprived and in vocational groups this factor is most clearly discernible, and the differences are most marked. Teacher intelligence is in the higher, professional category—high enough that, with sufficient knowledge and training, teachers should be able, in most cases at least, to deal with the intelligence differences of their pupils.

Questions

1. Cite illustrations of unfair treatment of dull children in school. What kinds of "escape" are open to the dull child?
2. Why should a child's school program and classification not be determined by one intelligence test?
3. What is the teacher's part in a testing program?
4. Discuss: All school procedures advantageous for the development of the dull child are equally effective for the superior child.
5. What psychological differences other than those of intelligence is it important to take into account in adjusting the school to the child?
6. How is it that bright pupils are often "retarded" and slow pupils "accelerated"? How may acceleration be considered as one form of enrichment? What are the weaknesses of this kind of enrichment?
7. Is there an educational fallacy (a) in giving the bright children who finish first, extra examples to do? (b) in allowing slow pupils an opportunity to do reviewing to make up for their failures along with their regular work?
8. Which plan of adaptation of individual differences would you prefer to have in successful operation at the school where your mentally superior brother (or sister) is in attendance? Why? How broadly can you generalize from this as to what is desirable in secondary education?
9. What was being done for the backward and for the superior children in the school with which you have been most recently connected as a student or teacher? What more might be done without a thorough reorganization?
10. Should every conscientious high-school girl or boy who wants to, be allowed to go to college? If so, what curricula should the college offer; if not, what other possibilities should he consider?

11. What criteria do you employ in judging the intelligence of another person?
12. Glance over some of the names of the great men of history whose lives are sketched in *Genetic Studies of Genius*, Vol. II, by Cox, and, selecting some with which you are familiar, estimate their IQ's before reading the estimates there given. Compare your results and the criteria employed with those of the author.
13. What evidence is there that the intelligence test is not a measure of the effect of schooling and other environmental factors?
14. Show how the IQ is useful in educational and vocational guidance. What other measures are needed to supplement the intelligence test for these purposes?

Readings

Anastasi, A. *Differential Psychology*. New York: Macmillan, 1939.
   Presentation of the data concerning individual differences.
Binet, A., and T. Simon. *The Development of Intelligence in Children*. Baltimore: Williams and Wilkins, 1916.
   Binet was a facile writer and is well worth searching out.
Binet, A., and T. Simon. *The Intelligence of the Feeble-minded*. Baltimore: Williams and Wilkins, 1916.
Bronner, A. F., W. Healy, G. M. Lowe, and M. E. Shimberg. *A Manual of Individual Mental Tests and Testing*. Boston: Little, Brown, 1927.
   A useful handbook of individual performance tests.
Freeman, F. N. *Mental Tests*. New York: Houghton Mifflin, 1939.
   A readable account of the subject of mental tests.
Garrett, H. E., and M. M. R. Schneck. *Psychological Tests, Methods, and Results*. New York: Harper, 1933.
   Various kinds of psychological tests are described in a conveniently detailed form.
Gilliland, A. R., and E. L. Clark. *The Psychology of Individual Differences*. New York: Prentice-Hall, 1939.
   A detailed discussion of individual differences.
Heck, A. O. *The Education of Exceptional Children*. New York: McGraw-Hill, 1940.
   Deals with the socially and the physically handicapped, and the mentally exceptional. The retarded are discussed in Chapters XXIII–XXV, the gifted in Chapters XXVI–XXIX.
Hollingworth, L. S. *Children above 180 IQ*. Yonkers-on-Hudson: World Book, 1942.
   A posthumous volume reporting several cases over a period of years with general principles and implications, and revealing the remarkable spirit and genius of one of the true pioneers in this field.

National Society for the Study of Education. *Intelligence: Its Nature and Nurture.* Part I. (*Thirty-ninth Yearbook.*) Bloomington: Public School Publishing Co., 1940.

The following chapters are particularly worth reading: I. "The Meaning of Intelligence," Frank N. Freeman; III. "The Significance of Deviates," L. S. Hollingworth and L. M. Terman; IX. "Intelligence as Related to Race," L. S. Hollingworth and Paul Witty; X. "Personality and Adjustment as Determiners and Correlates of Intelligence," L. S. Hollingworth.

National Society for the Study of Education. *Adapting the Schools to Individual Differences.* (*Twenty-fourth Yearbook,* Part II.) Bloomington: Public School Publishing Co., 1925.

Dr. Washburne and Miss Parkhurst tell about their schools (pp. 77–94), and Dr. Courtis reports on a plan of ability grouping (pp. 44–47) and the individualization of instruction (pp. 106–113).

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology.* New York: Harper, 1937.

Chapter V, "Intelligence," especially articles by Terman, Bagley, and Barrett and Koch; Chapter VI, "Adjustment to Individual Differences," especially articles by Pressey and Worcester.

Skinner, C. E. (Ed.) *Readings in Psychology.* New York: Farrar and Rinehart, 1935.

Pages 100–104, information on race differences; 120–123, studies of IQ constancy; 127–143, excerpts from the writings of Tredgold, Cyril Burt, Galton, Terman, Leta Hollingworth, and others on feeble-mindedness, genius, and on intelligence measurement; 683–686, social and cultural influences.

Skinner, C. E. (Ed.) *Readings in Educational Psychology.* New York: Farrar and Rinehart, 1937.

Pages 15–20, excerpts from Thurstone's article, "A New Conception of Intelligence," delineating his primary abilities; Chapter XVII, "Individual Differences," selections from Galton, Thorndike, Freeman, Washburne, and others; Chapter XVIII, "Intelligence and Its Measurement," selections from Terman, Spearman, Freeman, Thorndike, and others.

Spearman, C. *The Nature of "Intelligence" and the Principles of Cognition.* London: Macmillan, 1923. (2nd ed., 1927.)

The earlier chapters are delightfully written, analytical and constructive in developing the concepts involved in the two-factor theory.

Terman, L. M. *The Measurement of Intelligence.* Boston: Houghton Mifflin, 1916. Also L. M. Terman and M. A. Merrill. *Measuring Intelligence.* Boston: Houghton Mifflin, 1937.

The guide for the original Stanford Revision of the Binet Scale, and for the revised form.

Terman, L. M., and others. *Genetic Studies of Genius*. Stanford University: Stanford University Press, 1925–30.

Volume I, *Genetic Studies of Genius* (1925), is the monumental study of more than a thousand gifted children in California. Volume II, *The Early Mental Traits of 300 Geniuses*, by Catherine Cox (1926), from a search through their early writings and biographies, reveals something of the early nature and childhood abilities of three hundred immortals who lived before intelligence tests, though it is possible that the IQ's ascribed to them are too low. Volume III, by B. Burks, D. W. Jensen, and L. M. Terman, *The Promise of Youth, Follow-up Studies of 1000 Gifted Children*, 1930, presents a follow-up study of the children originally tested. A later follow-up report (after sixteen years) appears in Chapter III of the *Thirty-ninth Yearbook of the National Society for the Study of Education*, Part I, 1940, *Intelligence: Its Nature and Nurture*, pp. 67–84.

Thorndike, E. L., and others. *The Measurement of Intelligence*. New York: Teachers College, Columbia University, 1927.

Chapters I, XV, and XVI are the least technical but are based on experimental work.

The history of the intelligence-testing movement is described in the following:

Garrett, H. E. *Great Experiments in Psychology*. New York: Century, 1941.

Chapter I describes the work of Binet; Chapter II, the development of group tests; and Chapter III, the contributions of Sir Francis Galton to the measurement of individual differences.

Murphy, G. *An Historical Introduction to Modern Psychology*. New York: Harcourt, 1929. Chapter XXI.

Peterson, J. *Early Conceptions and Tests of Intelligence*. Yonkers-on-Hudson: World Book, 1925.

Activity curricula and various other forms of socialization are interestingly described in the following volumes:

DeLima, A. *The Little Red Schoolhouse*. New York: Macmillan, 1942.

Goddard, H. H. *School Training of Gifted Children*. Yonkers-on-Hudson: World Book, 1928.

Montessori, M. *The Montessori Method*. New York: Stokes, 1912.

Parkhurst, H. *Education on the Dalton Plan*. New York: Dutton, 1922.

Skinner, C. E., and P. A. Witty. (Eds.) *Mental Hygiene in Modern Education*. New York: Farrar and Rinehart, 1939.

Stratemeyer, F. B., H. L. Forkner, and M. G. McKim. *Developing a Curriculum for Modern Living*. New York: Bureau of Publications, Teachers College, Columbia, 1947.

Washburne, C. W. *Adjusting the School to the Child.* Yonkers-on-Hudson: World Book, 1932.

Washburne, C. W., and M. M. Stearns. *New Schools in the Old World.* New York: John Day, 1926.

Wrightstone, J. W. *Appraisal of Experimental High School Practices.* New York: Teachers College, Columbia University, 1936.

Achievement and Evaluation

The psychological approach to problems of learning involves the analysis and measurement of its products. A number of measurement procedures are discussed earlier in this volume: trait-rating, the sociogram, the behavior journal, and time-sampling in Chapter III, the measurement of interests and attitudes in Chapter IV, various aspects of growth in Chapter VII, and intelligence in Chapter VIII. It now remains to describe the methods of measuring achievement, that is, the ways of finding out how much the pupils have learned of what the school has endeavored to teach them.

Teachers have tested the knowledge of pupils since time immemorial. To do this it is necessary to use symbols that have to be read and interpreted. The skill of a performer in the practical arts, whether military, athletic, or more narrowly vocational, can be determined fairly objectively in terms of a vanquished opponent, a broken record, or a fitted part, where everyone can see. But who should judge which symbols should be called for in testing knowledge, and how good the product should be? It has been assumed that the teachers know. Though they have rarely agreed on the matter, or even been called into conferences, down through the ages they have made their judgments. Pupils have passed or failed on the basis of most elusive criteria; though some have complained, nothing much was done about it until the scientific movement spread into the field of education. The result was a complete overhauling of the whole procedure for measurement and appraisal.

1. Measuring Achievement

Why Measure? There are more reasons for measuring achievement than the pupil usually realizes. He is inclined to think that it is all to find out whether he passes or fails, and to get a mark to put on his report card. The following are some of the ends served by a testing program:

1. The learner is informed of the progress he is making. Just as a runner wants to be timed occasionally, so a pupil might be expected to want to know how he is getting along—not necessarily to see whether he can beat others, but to know how well he can do. This information is often desired by parents, particularly of younger pupils. But the usual marking system does not give it to them. A pupil may get a mark of C year after year, and since this is a relative mark it doesn't give any absolute measure of improvement over past performances.

2. The school is provided with a basis for classifying and promoting pupils, for awarding prizes and honors, and giving general educational and vocational guidance. Examination scores, however, are often obscured in the teacher's mark, which may be an average of the test scores, or it may be something else—how well the teacher thinks the pupil has tried, or whether or not he likes him.

3. The teacher has a basis for discovering where the instruction has succeeded and where it has failed. A test aimed to obtain this information is called a *diagnostic* test, and serves as a basis for remedial work. However, any examination may be used for this purpose. A discussion and explanation of points that cause trouble is valuable and is recognized as a definite teaching technique. For diagnostic purposes, an analysis of test results is important rather than the total score.

4. The teacher is provided with a basis for estimating the pupil's future success. A test aimed to obtain such information is called a *prognostic* test. However, those tests which seek to gauge native ability, like intelligence, as contrasted with achievement, are likely to be more useful for this purpose.

5. Test results are used in research studies to evaluate the effectiveness of instruction or of particular educational processes and techniques such, for example, as visual aids, democratic versus autocratic methods, and so on. The average performances of two otherwise comparable groups taught in different ways are compared, and, if reliable differences are found, it is concluded that the instructional method employed with the group making the higher scores is preferable.

What Should Be Measured? Fundamentally, the achievement test is designed to measure the degree to which the *objectives of instruction* are attained. It is often assumed that these are in the category of factual knowledge, that if a pupil knows the facts, if he can take paper and pencil and write what he knows on an examination, all is well. Granting the importance of a knowledge of certain facts, whether they be the meaning of words, the number combinations, or something else, there

are usually other instructional objectives that are at least implicit in the instruction. And any appraisal of pupil ability should take them into account.

Most courses of instruction involve the following general objectives to a greater or lesser degree. Specific objectives are represented in each case by one example:

1. Knowledge of certain facts—e.g., certain dates in history
2. Skill in performing certain manipulative acts—e.g., using a compound microscope
3. Understanding certain concepts and principles—e.g., the meaning of "compromise"
4. Ability in forming judgments and in reasoning inductively and deductively—e.g., discovering why an electric light bulb goes out
5. Appreciation of certain values—e.g., enjoying a poem

Matters of factual knowledge are easier to test than some other educational outcomes, and there is a certain kind of logic in testing them. In a course in literature one can argue that a knowledge of the names of the characters and what they did would be a proper outcome, as of course it is, and perhaps one could not have much of an understanding of the selection without it. But one may have this knowledge and still not have any understanding of the ideas presented either in relation to each other or to the events of the present day. Furthermore, the very process of acquiring the knowledge may be so distasteful as to produce a dislike for the selections read and for literature in general, which would certainly be contrary to the commonly accepted objectives of any course in this field.

Sampling of Items. Whatever the educational objectives that form the basis for the examination, a selection must be made, supposedly of some of the more significant items. Neither the pupil nor his examiner has the time or energy for an examination covering everything in a term's work. A small number of questions does not provide an adequate sampling, since the pupil may not have studied or may not remember the facts called for by one or two of them but be fairly well informed on other matters. If an accurate measure of his attainment is sought, he will be given the opportunity to show his familiarity with a large number of different matters. If the instruction involves other objectives than knowledge of facts, such as making judgments, performing skilled acts, or developing attitudes or points of view, these are likewise properly included in the sampling.

Some students prefer an examination with but three or four questions, especially if the instructor indicates more or less subtly what they are going to be, or if the student is a facile writer and has the gift of making a little knowledge go a long way! There is a guessing factor involved and the fun of taking a chance without the necessity of obtaining more complete knowledge and understanding. However, the more complete the sampling, the more effective is the test in measuring the student's abilities.

Validity. The term validity in educational psychology has a specific technical meaning. A test is said to be valid if it measures what it is intended to measure. An invalid test measures something else or perhaps nothing at all. For example, most essay examinations probably measure verbal fluency or the ability to write essays quite as much as they do the student's knowledge of a particular subject matter. There is also some evidence that they measure handwriting ability, and even the prevailing mood of the reader, or his attitude toward the student! To test their ability in reading, pupils are sometimes asked to give the meanings of words, in arithmetic to perform the fundamental processes rapidly and accurately, and in French to write out a translation. These may be indicators, but it is likely that they measure these functions better than they do the respective abilities. What is meant for a test of honesty or of ability in Latin may really be a test of intelligence, or one of perseverance.

The validity of a test is determined in various ways, usually by correlating the results with those from some other test, called the *criterion*, which is recognized as measuring the quality in question. For example, if one were to devise a new intelligence test, he would first find the extent to which it correlates with the Stanford-Binet scale. Wide discrepancies would throw the whole thing under suspicion. Of course, there are a number of qualities which have not as yet been measured adequately. A test of sociability or of leadership, for example, has no such commonly accepted criterion with which it may be compared. To meet this difficulty, various other means of establishing validity have been employed. Other criteria have been used than standardized tests—school marks and ratings, for example, and differences between the scores of younger and older pupils, or of other groups who are known to differ markedly in the quality being tested. Another approach is to determine by consulting textbooks, courses of study, examinations, and the judgments of experts whether a given test item is a legitimate question in the area tested. It is clear that these methods are relative. But

attention to them in constructing tests naturally results in improving test validity.

Objectivity in Scoring. If achievement is to be measured satisfactorily, when the items have been selected, the scoring must be as objective as possible. The essay-type examination is evaluated subjectively by the reader, who might not agree with another or even with himself if he scores the paper again later.

The facts of a subjective scale are well illustrated by the following anecdote concerning the grading of history papers by a group of college professors of history. One of the five or six expert readers assigned to a certain group of history papers, after scoring a few, wrote out for his own convenience what he considered a model paper for the given set of ten questions. By some mischance this model fell into the hands of another reader who rated it in a perfectly *bona fide* fashion. The mark he assigned to it was below passing, and, in accordance with the custom, this model was rated by a number of other expert readers in order to insure that it was properly marked. The marks assigned to it by these readers varied from 40 to 90.[1]

Other cases have been reported, such as those of the English paper marked separately by 142 English teachers all the way from 50 to 98, and of the geometry paper with marks ranging from 28 to 92 per cent as marked by 114 geometry teachers.[2]

One cause for such discrepancies is the differing standards of different teachers, schools, or departments. In some college courses, for example, as many as 15 to 25 per cent of the students are regularly failed, sometimes in mathematics or chemistry or perhaps in an occasional militant English department. In others, very few fail; one university course, in which everybody got a B, was locally known as the "beehive." Students have other names for such courses, which, while they are popular, may not be highly respected. An effort to determine the meaning of the different marks is often a corrective in such a predicament.

Another cause of such discrepancies is the lack of agreement on the value of the different items called for. If, instead of marking isolated papers, the teachers are allowed to mark a group, as they usually do, and

[1] Told by Ben Wood and reported in P. M. Symonds, *Measurement in Secondary Education*, 1927, p. 14. By permission of the Macmillan Company, publishers.

[2] D. Starch and E. C. Elliott, "Reliability of the Grading of High School Work in English," *School Review*, vol. 20 (September, 1912), 442–457. D. Starch and E. C. Elliott, "Reliability of Grading Work in Mathematics," *School Review*, vol. 21 (April, 1913), 254–259.

especially if they agree beforehand on the importance to be attached to different points, much less disparity is found. In one study twenty-three teachers marked twenty-four arithmetic papers on the basis of a hundred-point scale with the result that the average of the deviations of their markings was only five points, and the marking of individual questions on the papers was likewise quite close. Ideally, anyone scoring a test will get the same result as anyone else.

Objectivity of Criteria of Excellence. What shall determine the success or failure of a student? What is the passing mark? In the old days, it used to be 75 per cent or sometimes lower. Theoretically, this meant that on the average, if a pupil got less than three-quarters of the questions on his tests right, he failed. But no question was raised as to how difficult the test should be—a knowledge of which, if it was anywhere, was in the mind of the teacher! With such a marking system it was quite possible for all the pupils to fail, at least on one examination, simply because the instructor thought up questions that were too difficult. Otherwise it would mean either that the pupils were not properly classified or that the instruction was very poor indeed. Sometimes the process worked the other way around. A teacher decided whether a pupil should pass or fail and marked him accordingly. This implies that in the mind of the teacher a subjective standard exists either for the class as a whole or for individual pupils. Evidence for the latter is to be found in such statements as the following: "He is not working up to capacity," or "She should be able to do fourth-grade work," or, showing evidence of the recognition of developmental factors, "He should not be expected to compete with the others."

One may ask how little, and also how much, a student should know to "pass." Some argue that nothing less than *mastery* should be demanded, that pupils should master the subject matter. If one starts across a river and gets only half way across, they say, he could be given a mark of 50 per cent; but he is worse off than before he started, and should not be given any credit at all unless he gets all the way across. This is readily seen to be a false analogy. Mastery of subject matter is relative, like mastery of a complex skill. The child is not expected to run 100 yards in 10 seconds or to play a violin like Heifetz. Nor is he expected to be able to interpret the Industrial Revolution or the meaning of an equation like a university professor, though this does not preclude his knowing something about them. Of course, if the units are definitely within the capacities of the pupil, and if the objective is considered worth the expenditure of time needed, there is no argument against mastery.

It has taken a long time for those concerned to recognize fully the distinction between what a pupil knows or can do and what he should be able to know or do for a particular purpose. His achievement can be measured; its level determines such things as whether he will continue in school, be segregated in a special class, go on to the next grade, enter a more advanced course, be selected to represent the school, be admitted to college or technical school, be the recipient of special honors or awards, and so on. These are matters of judgment based on the scores made, not a function of the measuring instrument. The scientific approach to the problems of measurement took the criterion of excellence out of the examination and out of the mind of the individual instructor and placed it where it belongs—namely, in the performance of the individual pupil in relation to the performance of other pupils. There it becomes a point of objective reference on the basis of which judgments of individual qualifications for specific purposes can be made. But even now the older view is still imbedded in the thinking of many people. They look on uncomprehendingly while teachers try to explain why a child is promoted even though he "fails" a grade, or why a school system should be set up so that no pupils fail. It takes time and patience to explain that the objectives for a pupil are things he can learn to do and that scores he makes on tests are used as a basis for deciding the educational experiences that should be provided for him.

2. OBJECTIVITY: PERFORMANCE AND PRODUCT

Record and Judgment. In many of the simpler skilled acts, the best way to test performance is to set the learner to work and record his *speed.* This would apply, for example, to races, to many industrial skills, to typing and telegraphy if accuracy is controlled. In other skills, time is not of the essence but *amount,* e.g., distance or weight, as in jumping and the shot put, or *precision,* as in archery. These variables present no great difficulty in measurement, even when transferred to shop work. Many skills, such as fancy diving, music, and art, require judgments of *form,* in which certain criteria of excellence are agreed upon and the performance of product is judged accordingly.

The Check List. For most skills, even including some of those mentioned above, either more than one criterion applies or an analysis of the total performance reveals parts which, if improved, would result in a higher degree of skill. For example, in the use of the compound microscope all phases might be performed satisfactorily except for precision in focusing high power, a lack of which results in breaking slides.

The check list, made up of elements that are needed for the total performance, has been found to be of value as a means of indicating what school skills show progress and what ones require attention. Such a list is often more useful than the usual marks on the report card. Performance scores may be arbitrarily constructed from them if so desired.

Scaled Samples. Sometimes the performance is appraised; sometimes the product. In appraising a product, it is often convenient to have a series of samples of products ranging from very poor to excellent. The performance of a pupil is then compared with the samples to find which one it most nearly resembles. Such *quality scales*, as they are called, have been devised for handwriting, for English composition, drawing, lettering, and other pupil products. The scales themselves are constructed from a large number of samples arranged in order from worst to best, those being chosen concerning which there is agreement among judges as to their degree of excellence. Even a poor scale is apt to be better than none at all, for it at least remains constant, whereas a subjective criterion varies from person to person and even tends to vary for the same person over a period of time.

The Essay Examination. In spite of the weaknesses of the essay examination, it has a definite value. The best way to test the learner's achievement, other things permitting, is to have him do as well as he can what he is learning to do and then appraise the performance or the product. In line with this principle, if it is desired to measure a student's ability to write an essay, the best way to do it is to have him write an essay, and then judge how well he has done it.

The abilities called for in writing an essay may be outlined as follows:

1. To select from what is known those items which bear upon a particular point and delineate their relationship to it.
2. To organize this information and the related ideas according to certain esthetic principles, such as unity, coherence, and emphasis.
3. To exhibit such accepted qualities of prose style as good diction, sentence structure, and possibly spelling and punctuation.
4. To reveal a modicum of originality and critical insight in the treatment of the subject.

That these abilities may be measured, they should, of course, be made explicit. Furthermore, the questions should be stated in such a way that the particular treatment desired is conveyed to the student. A question that begins with "Discuss," for example, should not be expected to

bring out the idea that the formulator had in mind. Pupils are not mind-readers.

The suggestion has been made, in order to give greater specificity to the essay question, that care be taken to use one of the following words, according to what may be desired in the answer:[3]

what	describe
who	contrast
when	compare
which	explain
where	develop
list	summarize
outline	evaluate

To this list the following might be added: criticize, support (the view that), analyze, and illustrate.

If the directions for essay questions are stated precisely, their evaluation will be easier and more objective. The tasks are rendered more comparable. If no choice of questions is allowed, appraisal is made of the same task. It would be difficult to compare the excellence, say, of a suburban residence and an office building. Two or more suburban residences (or office buildings) could be compared more satisfactorily.

But in the examinations, as well as in the above illustrations, it would be desirable to have a list of elements that should be considered, their presence or absence noted, or their quality rated. One kind of answer on the item would receive full credit, another less credit or none at all. A total of credits would be the student's score for the question. This is referred to as the "check-list-point-score method." If certain qualities of the answer do not seem to be measured by the check-list items, the list needs revision.

A somewhat more subjective method of scoring essay questions is to sort them into about five piles on the basis of whatever criteria are deemed important. It would ordinarily be expected that the outer piles, the best and the poorest, would have a smaller number of papers in them than the piles in the middle. Occasional rereading of some of the papers serves to check the sorting, resulting either in a confirmation of the judgments made or in revisions. The difficulty with this procedure is that faults and excellences tend to balance each other in the same paper. However, if such equivalencies are sorted consistently, the advantages of the method are still retained.

[3] C. C. Weidemann, "Review of Essay Test Studies," *Journal of Higher Education*, vol. 12 (January, 1941), 41–44.

3. Objectivity—the Short-Answer Test

General Considerations. Many kinds of intellectual abilities can be measured more adequately by the use of short-answer tests than by the use of check lists or essay examinations because of their wide-sampling of items and their greater objectivity and validity. However, much time and care must go into their construction.

1. The questions should be mimeographed (or printed) with proper space for the student's name, the date, and any other information desired; the directions should be clear and concise.

2. The questions should be so constructed as to permit of but one correct answer to each, which can be given with a minimum of writing.

3. The questions should be so arranged as to facilitate scoring. Space for the answers is arranged along the margin; against these can be held the *stencil* or *scoring key* having the correct answers on it spaced in accord with the test sheets. Discrepancies on pupils' papers are checked with a half-inch horizontal line in the margin beside the correct answer. Omissions may be marked with a small circle. For older pupils and college students, standard-form answer sheets may be used; and a scoring stencil may be punched to facilitate scoring.

There follow a number of samples of different kinds of short-answer test forms. The same questions are used for each, selected from different school subjects, preceded by a satisfactory form for the directions, and followed by such comments and cautions as may be helpful in making out the tests. Much more complete details and many more examples are furnished in the references given at the close of the chapter.

The True-False Test.

Directions: Below are a number of statements some of which are true and some false. On the line at the left of each statement put a plus sign (+) if the statement is true and a zero (0)[4] if it is false.

_____ 1. Columbus discovered America in 1620.
_____ 2. Portia is one of Shakespeare's great female characters, who appears in *Macbeth*.
_____ 3. The French word for knife is *le couteau*.
_____ 4. Its gender is masculine.

The statements of the true-false test should be brief; simple sentences are less apt to be ambiguous than complex or compound. (This rule is

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[4] Or minus sign (—), which, however, is less easily discriminated from the plus.

violated in illustration 2, above.) They should be independent of each other (which is violated by 4). They should be significant, not trivial, and about (not exactly) half of them should be true and half false. This type of examination may also be given orally, in which case the pupils write the numbers in a column on blank paper and write each $+$ or 0 after its proper number; each statement should be read slowly and clearly twice. Because a pupil could get about half the answers right by chance, even if he knew nothing about the subject, the true-false test is scored *right minus wrong* $(R - W)$. That is, the number of wrong answers is subtracted from the number of the statements marked correctly. A short-cut method is to deduct from the total number of questions two for the wrong answers and one for the omissions.

The Multiple-Choice Test. The multiple-choice form of examination is also called the *multiple-response* or *recognition* test.

Directions: Each of the statements below can be correctly completed by one of the four words which follow it. Find the one that makes the best answer and put its *number* on the short line at the right.

1. Columbus discovered America in (1) 1620; (2) 1492; (3) 1609; (4) 1066   _____ 1
2. Portia appears in (1) Macbeth; (2) Ivanhoe; (3) Bible; (4) Merchant of Venice   _____ 2
3. The French word for knife is (1) la fourchette; (2) le Messer; (3) le cerveau; (4) le couteau   _____ 3

The difficulty in constructing this form of test lies in the ingenuity necessary in thinking up four or five plausible alternatives within a limited field. The system of recording numbers at the right instead of underlining the correct response makes for more rapid scoring, but should not be used at age levels where it is too difficult for pupils to make such substitutions. The correct answer comes now first, now third, and so forth, in irregular order, so that the pupil will not use its position as a false cue. The test is usually scored number right, though in some cases the formula given for scoring the true-false test, that corrects for chance, $R - W/(N - 1)$, is used, where $R =$ the number right, $W =$ the number wrong, and $N =$ the number of choices for each question (here, 4).

The Best-Answer Test

Directions: Put a check mark on the short line just before the best answer to each question.

I. Why did Columbus set sail? Because
    _____ 1. He wanted to discover America.
    _____ 2. He sought a shorter trade route to India.
    _____ 3. He was really a fugitive from justice.
    _____ 4. He believed that he could find a better route than Magellan had.
II. Portia is the character who
    _____ 1. Walked in her sleep.
    _____ 2. Was queen of love and beauty.
    _____ 3. Masqueraded as a lawyer.
    _____ 4. Married Jessica.

It can be seen that the best-answer type is really another form of the multiple-choice test, as is the one which follows.

Matching Test

Directions: On the line at the left of each term in the first column write the number of the phrase that defines or explains it.

_____ bacteria   1. Character in Shakespeare
_____ Columbus   2. Discoverer of America
_____ hypotenuse   3. First President of the United States
_____ le couteau   4. French word for knife
_____ Portia   5. Microscopic form of life
                      6. Part of a triangle

Although the diversity of terms makes these samples somewhat ridiculous, this is a very usable form for vocabulary tests or definitions of technical terms or identification of literary or historical characters. An extra item or so in either column cuts down the guessing factor on the last one or two doubtful items. If both columns are in alphabetical order, a chance arrangement is secured, and also answers can be recorded more rapidly. The score is number right.

The Completion Test. In the forms presented thus far the pupils are asked merely to select the right answer from two (true-false test) or more given possibilities. As a rule those who can do this are the ones who can also think of the right answer if it is not given, though this is more difficult. The recall form of the completion test is illustrated below:

Directions: Complete each statement by writing the missing word on the line at the right.

1. Columbus discovered America in the year   ———————— 1
2. Portia appears in   ———————— 2
3. All bacteria are   ———————— 3
4. The French word for knife is   ———————— 4

Great care must be taken in making out these items, for only statements for which there is but one answer can be used to advantage. The first is all right with "the year" in place, but, without these two words, many answers might be found, such as "place," "time," or "desperation." Similarly, questions 2 and 3 open the way for all the high-school wits to do their worst. The score is the number right. The completion test may be complicated by longer sentences with more frequent omissions, as follows:

1. In the year (1) Columbus set out on his famous voyage in search of a shorter route to (2).

2. Portia appears in the play written by (3) named (4). She disguises herself as (5), delivers her (6) from the clutches of the (7) named (8) and then returns to her home in (9).

1 ————————
2 ————————
3 ————————
4 ————————
5 ————————
6 ————————
7 ————————
8 ————————
9 ————————

As in the multiple-choice test, the system of recording answers at the right facilitates scoring. On intelligence levels where this presents difficulties, however, children should be given test forms in which they may write the missing words in blank spaces in the text. The completion test is subject to the same difficulty as the simple recall form, namely, avoiding statements which can be completed in more than one way. There is another danger as well, and that is the temptation to leave too many blank spaces, making it a rather hopeless puzzle for the pupil. (The second example above leans decidedly in the direction of this fault.) It is much easier for the one who has made out such a test to think of the right answers than it is for someone else.

4. THE DISTRIBUTION, A BASIS FOR EVALUATION

Representing a Distribution. If the achievement of the individual as compared with that of others is to provide the basis for evaluation, instead of the subjective judgment of the individual teacher, it becomes necessary to employ ways of dealing with the records of such achievement. The objective methods of testing just described furnish numerical

scores, referred to as *raw scores*. These form the units of measurement to be compared, and for any one test they are distributed irregularly, ranging from the highest to the lowest. It is necessary to learn to think quantitatively, if one has not done so already, in terms of the arrangement, along a scale, of fairly large numbers of scores. Some of the more common concepts, but not the statistical procedures involved, are here described.

The simplest way to get an idea of the way in which the scores on a test are distributed, providing there are only a few of them (not more than twenty or thirty), is to place them in *rank order*, beginning with the highest, which is given a rank of 1. (When two or more scores are the same, each is given the same rank—the midpoint of the ranks they would get if numbered successively.) The rank of the lowest score will be the same as the number of scores ranked. Ranking the scores makes it possible to see where any score stands in relation to the others.

When there is a large number of cases, the scores are more conveniently grouped in the form of a *frequency table*. In Table 8 the tallies are also included, in clusters of 5. It will be noted that the high scores are at the top; and the interval between the bottom score of one group and the bottom score of the next above or below (class interval) is the same throughout. In this table it is 5; but with a wider (or nar-

TABLE 8 *Frequency Table*

SCORES	TALLIES	FREQUENCY (f)
75–79	//	2
70–74	//// /	6
65–69	//// /	6
60–64	//// ////	9
55–59	////	5
50–54	////	4
45–49	/	1
		N = 33

rower) range of scores it might be larger (or smaller). Also the top of one interval does not overlap the bottom of the next above. The frequency table, also called a frequency distribution, shows the extent to which the scores tend to pile up toward the center.

This phenomenon can be observed more clearly if the distribution

is represented graphically. If the class intervals that appear in Table 8 are marked off as equal distances on a base line, the high scores at the right, and perpendicular columns drawn to the height of the frequencies marked off on the vertical scale at the left, when lines are drawn closing the tops of the columns, the result is a histogram (Figure 28). Or, if a line is drawn which would connect the midpoints of the lines closing the tops of the columns (the lines and columns being omitted), the result is a *frequency curve*, also called frequency polygon and surface of frequency (Figure 29). The curve is more satisfactory if one wishes
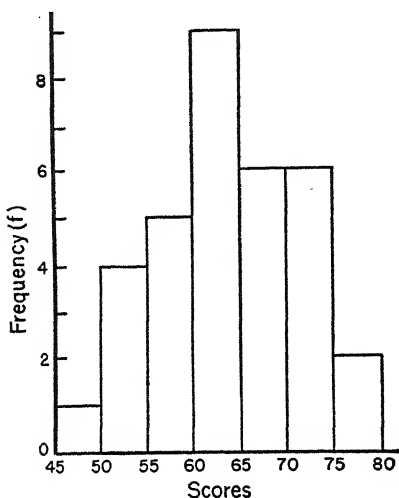
Figure 28. Histogram Drawn from Data in Table 8
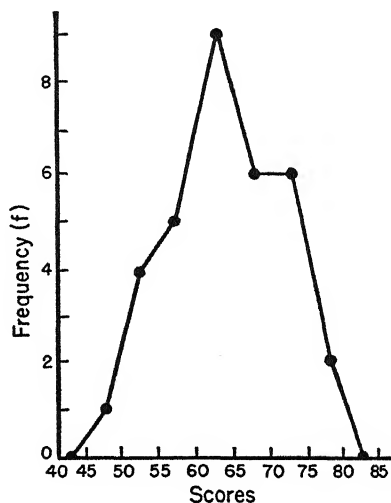
Figure 29. Frequency Polygon Drawn from Data in Table 8

to compare graphically the scores of two groups (Figure 30). If the scores pile up at the left and slope off to the right, the curve is said to be skewed to the right, or positively. If they slope off to the left it is skewed to the left, or negatively. Figures 31 and 32 show the characteristics of *skewness*.

Sometimes the curve is almost symmetrical with its high point in the center and falling away gradually at each side. The curves shown in Figures 30 (Form B), 33, and 34 are examples, one representing a large number of scores on a reading test, the second physiological growth, and the third the chance fall of pennies. All of these approximate the mathematically drawn *probability curve* (Figure 35), which is also variously called the curve of chance, normal curve, normal frequency

curve, theoretical probability curve, bell-shaped curve, and curve of Gauss.

The normal curve, which is constructed mathematically from the binomial theorem $(a + b)^n$, represents one of the most significant prin-
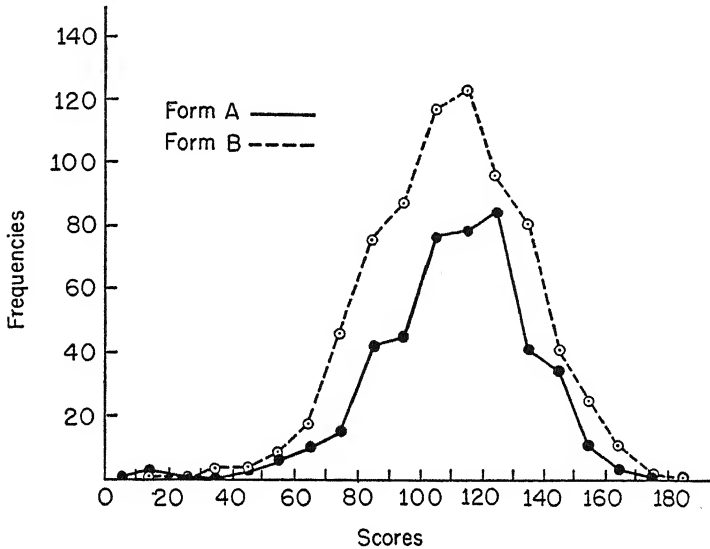
Figure 30. Frequency Curves to Compare the Results for Form A (N = 450) and Form B (N = 738) of the Same Reading Test
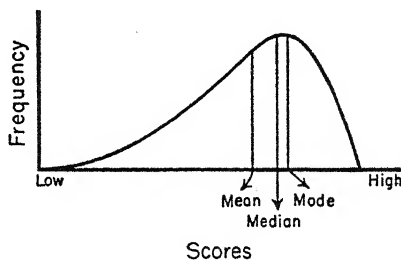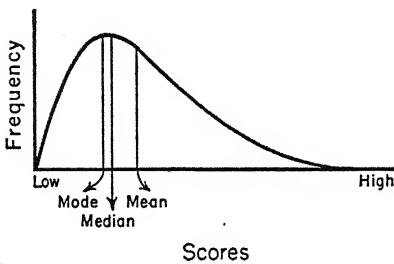
Figure 31. Positive Skewness—to the Right   *Figure 32. Negative Skewness—to the Left*

ciples in all biology, namely, the nature of the distribution of biological traits. Nature seems to aim at a target, as it were, misses often, but with the hits clustering around the center, and the misses growing more and more infrequent the farther they are away. There are no skips (except when cases are few or at the far ends of the distribu-
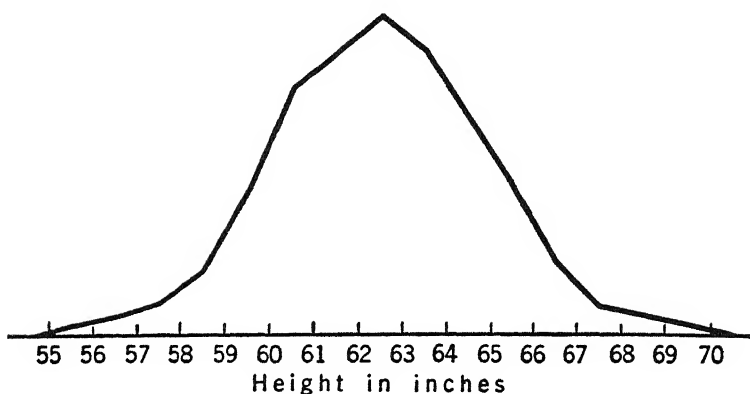
Figure 33.   *Distribution of the Heights of 1052 Women*   The horizontal base line shows the height in inches, the distance above it indicates the frequency. (From D. Starch, *Educational Psychology*, 1927.   By permission of the Macmillan Company, publishers.)
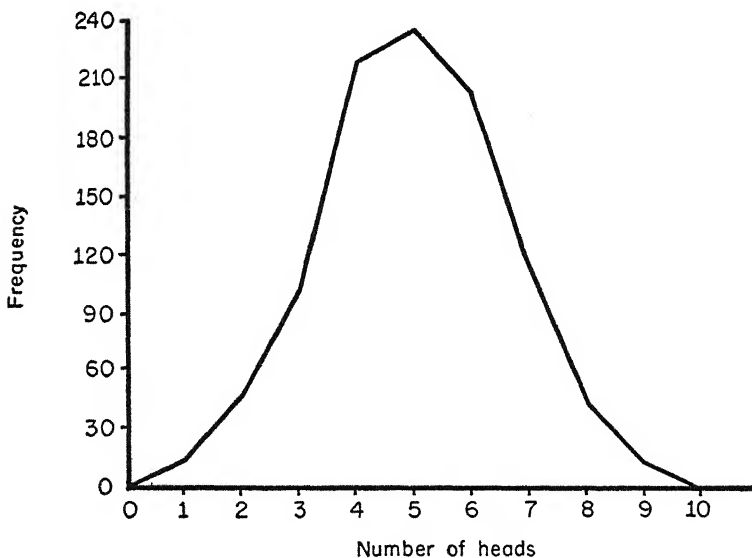
Figure 34.   *Distribution of the Number of Heads Up in Tossing Ten Pennies at a Time 1000 Times*   The horizontal line shows the number of possible heads up in each tossing; the vertical gives the number of times each number of heads was up.   (From Starch, *op. cit.*)

tion); and there are no boundary lines. Tall men, men of average height, and short men exist only as arbitrary boundaries are set; for who shall say at what height the average men leave off and the tall men begin? At five-feet eight, five-feet ten, or six feet? Similarly, children's scores do not divide them into separate groups to be designated as the bright, the average, and the dull, or fast, average, and slow. If they did, there would be no normal curve; the "distribution" would look like Figure 36. Children may be so grouped, but the groupings are arbitrary divisions made for convenience.

Central Tendency. If there is need to compare two groups in
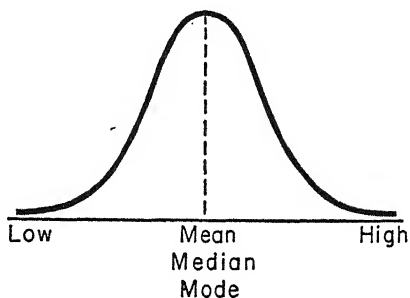
Figure 35. The Theoretical Probability Curve

some ability, two frequency curves can be drawn, as has been shown (Figure 30). Or the averages may be compared. Instead of the word *average,* the term arithmetic mean, or, more simply, the *mean,* is used by statisticians, who use the term average to apply to any of the measures of central tendency. Even elementary-school children know that it is obtained by dividing the sum of the scores by the number of pupils taking the test. $(\Sigma X)/N$ means the same thing, since the Greek capital sigma (Σ) stands for "sum of," N for the total number, and X for the scores. If the scores are sufficiently numerous to be arranged in the form of a frequency table, the process of computation is somewhat more complicated. The mean is called a measure of "central tendency."

Figure 36. Hypothetical "Distribution" of Types

Another measure of central tendency, called the *median*—in certain ways more satisfactory than the mean—is often used. If twenty-five men were standing in a row in order of their height, with the tallest one on the left and the shortest one on the right, the mean or average could be ascertained by measuring the height of every man, in feet

and inches, adding these figures, and dividing by 25. The median, how-
ever, would be obtained by measuring the thirteenth man only, counting
from either end. (If there were an even number of men, the median
would be the average height of the two middle men.) The median may
thus be described as a "counting average." It is the score on either
side of which half the cases occur when the cases are arranged in
ascending or descending order, i.e., ranked or arranged in the form of
a frequency table.

There is still another common measure of central tendency, called the
mode. It may be obtained simply by inspection of the frequency curve
or table. It is indicated by the high point of the curve, the score obtained
by the greatest number of people. The score is read from the base line
of the curve or the histogram, or from the scores (left column) of the
frequency table as the midpoint of the interval or group of scores that
has the largest *f*. A distribution may be *bi-modal*, the curve showing
two high points. In such cases, obviously neither would give a fair
indication of the central tendency of the group.

For the distribution in Table 8 the mean is 63.2; the median, 63.1;
and the mode, 62. The more nearly the frequency curve approaches
the normal probability curve, the nearer these three measures of central
tendency come together. In the theoretical probability curve, they are
identical, as indicated in Figure 35. If the distributions are skewed, the
mode is the high point, the mean farthest down the slope, and the median
between, as indicated in Figures 31 and 32.

The question sometimes arises, how is one to know which of these
three measures of central tendency to use. In general, it can be said
that the mean is the most representative of the total group, since each
score contributes to it. This is not true of the median, as may be clearly
illustrated in the case of a skewed distribution. For example, if we think
of the median as the middle of the three scores, 5, 25, and 30, it would
be 25; but it would also be 25 if the first of the three scores were 20
instead of 5. The mean in the first case would be 20; in the second, 25.
Thus the low score influences the mean but not the median. If in any
case it is considered that such an influence distorts the result unduly, the
median might be used. It is also used to obtain a measure of central
tendency quickly and easily. The mode is used only when an approxi-
mation is wanted or, of course, when one wishes to know what score
occurs most often.

Variability. If you learn that the median score of a ninth grade in
an arithmetic test is 10, you would not know whether all the pupils

scored close to 10 (homogeneous group) or whether they were scattered, with a few very high scores and some low ones (heterogeneous group). In Table 9, and also in Figure 37, we have an illustration. The median in each case is 10 (the midpoint of the group 9 to 11), but the constitution of the two groups is obviously very different.

TABLE **9** *Two Groups with the Same Central Tendencies but Differing in Variability*

SCORE	GROUP I f	GROUP II f
18–20	0	3
15–17	0	4
12–14	8	5
9–11	15	6
6– 8	7	5
3– 5	0	4
0– 2	0	3
	$N = 30$	$N = 30$

Group II has several pupils with higher scores and several with lower scores than any in Group I. Clearly some other figure than the central tendency is needed to present such facts as these. The common one is, of course, the *range*. We can say that the scores in Group I (using the midpoints of the class intervals) range from 7 to 13, or have a range of 6; while those in Group II range from 1 to 19, or have a

TABLE **10** *Tabulation from Table 9*

	GROUP I	GROUP II
Median	10	10
Range	6	18

range of 18. Or we might refer to the original score sheets or raw data to see exactly what the scores are, instead of trusting to the midpoints of the extreme intervals. The difference can be shown compactly in

tabular form, as in Table 10. However, if one pupil in Group I had scored 1 and another 19, the range of both groups would have been the same. Thus, the range cannot be counted on to give a true picture because it is so dependent upon the presence or absence of the highest and lowest scores; hence it is said to be an *unstable measure*.

This difficulty can be avoided by using some other measures of variability. One of these is the *average deviation*, abbreviated AD (sometimes called the mean deviation, abbreviated MD; or mean variation,
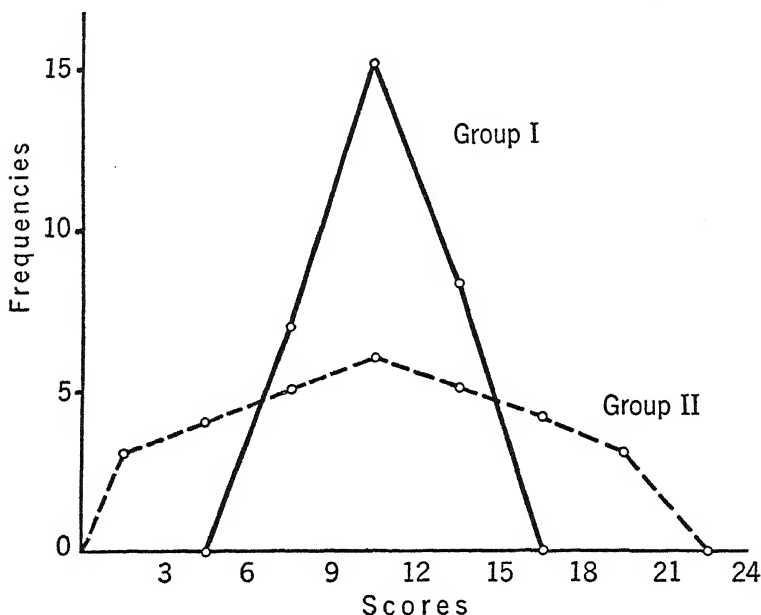
Figure 37. Curves of Two Distributions with the Same Central Tendency, but Differing in Variability (Data is from Table 9.)

abbreviated MV). The principle of this is simple. Suppose seven people took a test and received the following scores: 2, 5, 5, 7, 8, 10, 12 (Table 11). The mean is 7. The best score, 12, is 5 points above the mean. In other words, it "deviates" 5 points. The next highest score, 10, deviates 3 points, and so on. Deviations above the mean are positive; below the mean they are negative. The worst is 5 points below. Similarly, we can figure the distance that each is above or below the mean. (The AD is usually calculated from the mean, though the median or mode may be used.) In Table 11 the scores are listed in the first column, and the distance or deviation of each from the mean (or median) in

the second, or *d*, column. It is easy, then, to add the deviations (*d* column) *arithmetically*—that is, without regard to signs—and divide by the number, and so get the average deviation:

$$\text{AD} = \frac{d}{N} = \frac{18}{7} = 2.6$$

TABLE 11 *Deviations*

SCORES	d	d^2
12	5	25
10	3	9
8	1	1
7	0	0
5	−2	4
5	−2	4
2	−5	25
$N = 7$	$\Sigma d = 18$	68

If a similar group showed an average deviation of 3.5, the latter would be more scattered or heterogeneous. If, on the base line of the normal curve, the AD is laid off on each side of the mean, the *middle 57.5 per cent* of the cases making up the distribution are included. Thus, the people who scored between 4.4 and 9.6 (the 4.4 is 7, the mean, minus 2.6, the AD; and the 9.6 is 7 plus 2.6) would, if the distribution were normal, constitute 57.5 per cent of the cases. Actually, they are 4/7 of the group of 7, or 57 per cent, which is very close considering the small number of cases.

The *standard deviation*, abbreviated SD, or σ (sigma) is another measure of variability. It is like the AD except that it is always calculated from the mean and is obtained by squaring the deviations before they are added and later extracting the square root. The standard deviation can thus be obtained for the scores in Table 11, where the deviations are squared in the d^2 column,

$$\sigma = \sqrt{\frac{\Sigma d^2}{N}} = \sqrt{\frac{68}{7}} = \sqrt{9.71} = 3.1$$

The standard deviation includes a slightly larger range of scores than the average deviation. In the normal distribution, if the standard deviation is laid off on each side of the mean, the middle 68.26 per cent

of the scores are included. In this group, the scores between 3.9 and 10.1 (the 3.9 is 7, the mean, minus 3.1, the SD; and the 10.1 is 7 plus 3.1)—$\frac{5}{7}$, or 71 per cent—would be included.

Perhaps the most convenient measure of variability is the *quartile deviation*, abbreviated Q. The name should not obscure the fact that this measure, like the AD and SD, also represents a distance on the scale, albeit only a part of the total range. Q is half the range of scores of the middle 50 per cent of the group, the average of the two quartiles. We have already learned that the median is the 50-percentile point,
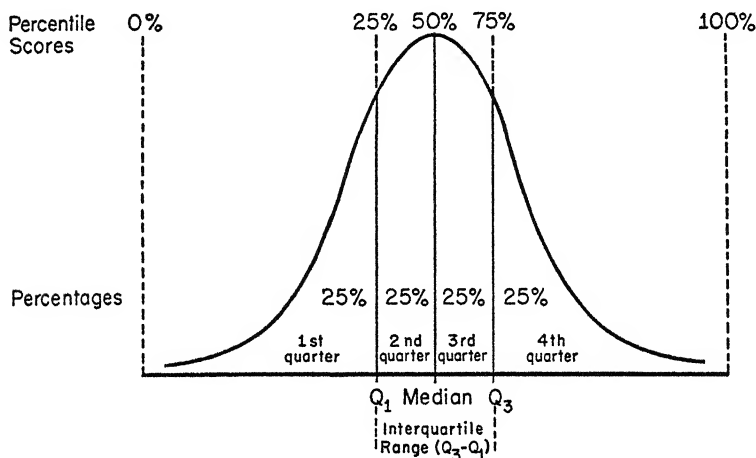
Figure 38. Normal Distribution Divided at the Quartile Points

dividing the distribution in half. Each of these halves is then divided in two in the same way, so that the total distribution is then divided into quarters with the same number of persons or scores in each. The lowest of these dividing points, which are called *quartiles*,[5] is called Q_1, the middle one is the median, and the upper one is Q_3. The distance from Q_1 to Q_3 ($Q_3 - Q_1$) is the range of the middle half of the scores, as shown in Figure 38. It can be seen that this is a much more stable measure than the total range, because if two or three people were absent around the quartile points those left would have so nearly the same score as to make no appreciable difference, whereas there is apt to be a wide scattering toward the ends of the distribution.

[5] The term quartile, though properly applied to the division points, is frequently used to apply to the quarters of the distribution. Thus it is sometimes said that a score is in the fourth (upper) quartile, instead of saying that it is above the third quartile, or in the fourth, or upper, quarter.

This dividing of the distribution by the use of quartiles serves another purpose than that of measuring the extent of scatter or variability of one group in comparison with another. It makes a convenient way of getting a rough estimate of the position of a person in a group, and hence of determining the degree of excellence of his mark. A score of 47 in an arithmetic test has more meaning, for example, if one knows that it is above the third quartile, i.e., that at least 75 per cent of the scores are lower. A similar score derived from σ is better if greater precision is desired, though percentile scores are frequently used for this purpose.

Correlation. It will also be convenient to have some figure which will represent a relationship of measures, this time the extent to which those who do well in one respect, say in the matter of intelligence, also do well in another, such as academic achievement. There is such a figure, called the *coefficient of correlation,* which is a measure of the degree of relationship between two variables. This coefficient, indicated by r, ranges from $+1.00$ through zero to -1.00. Perfect positive correlation (Figure 39) is indicated by $+1.00$, which means that the person who gets first place on one test gets first on the other; the second on the one gets second on the other; and so on through to the last on one who also gets last on the other. Of course, this rarely happens. Similarly, -1.00 is perfect negative correlation, which means that the first on one test is last on the other; and so on through to the last on the one, who gets first place on the other. Such cases are equally rare. Zero correlation, or a coefficient close to zero, means no correlation at all, no relationship between the scores. There would be little or no correlation, for example, between intelligence and the number of letters in people's names. In psychological and educational testing, in cases where an approximation to perfect correlation is taken as a standard, intermediate points between zero and perfect correlation are referred to somewhat as follows:

.80 to .95 very high
.60 to .80 high
.40 to .60 substantial
.20 to .40 low
.05 to .20 very low

However, when the usual correlation found between certain variables is taken as a standard, this nomenclature does not hold. For example, a correlation of .20 between mental age and handwriting scores would

be very high for this particular relationship. More meaning may be given to the significance of different correlations by indicating some which have been found between measures of intelligence and of school performance:

.94 Stanford-Binet with itself
.91 Vocabulary age and mental age
.84 Stanford-Binet with Dearborn Form Board, Grade I
.65 Average of school marks and entrance examination marks with Harvard freshman marks
.59 Thorndike Group Intelligence Examination with Columbia freshman marks
.58 Stanford IQ with Porteus Maze, Grade I
.50 College entrance examinations with Harvard freshman marks
.43 College entrance examinations with Columbia freshman marks
.41 Stanford-Binet and fundamental processes in arithmetic test
.36 Group intelligence examination and marks in handicraft
.31 Thorndike Intelligence Examination with Bryn Mawr freshman marks
.27 Pressey intelligence test and Burgess reading test
.21 Stanford-Binet with school marks in writing
.21 Stanford-Binet with school marks in drawing
.13 Test scores and alphabetical arrangement of names
.003 Binet mental age and scores in handwriting.

One way to get a general idea of the degree of the relationship of two variables, as two such groups or scores may be called, is by a graphical representation (Figure 39). If the person who got high score on one test also got high score on the other, the line connecting these points would be horizontal. If there were perfect positive correlation, the result would look like a ladder with no crossing lines, as in the left-hand figure, though the steps might be unequal distances apart. Perfect negative correlation would be indicated if every line crosses every other line, as in the right-hand figure. Zero correlation would be indicated by a random, helter-skelter criss-crossing of lines. Hence the amount of correlation can be approximated by inspection.

Another way to get a general idea of the nature of the relationship of two *variables* is by the use of a *scatter diagram* (Figure 40). The higher the positive correlation, the more nearly do the dots of the scatter diagram tend to fall along the diagonal. The more they scatter, the lower the correlation. If they tend to take places along the other diagonal, the correlation is negative (Figure 41). Such correlation is said to be *linear*, because the dots fall along a straight line. Linear cor-
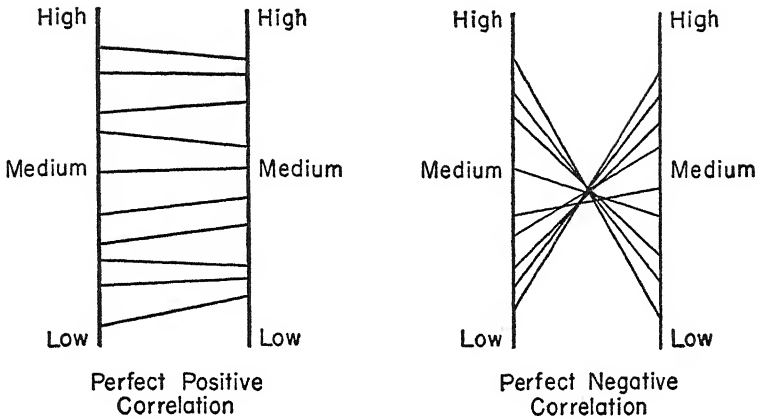
Figure 39. Graphical Representation of Perfect Positive and Perfect Negative Correlation The scores of one test range from low to high along one vertical line, and those of the other test along the other line. Each cross-line connects the scores of the same pupil.
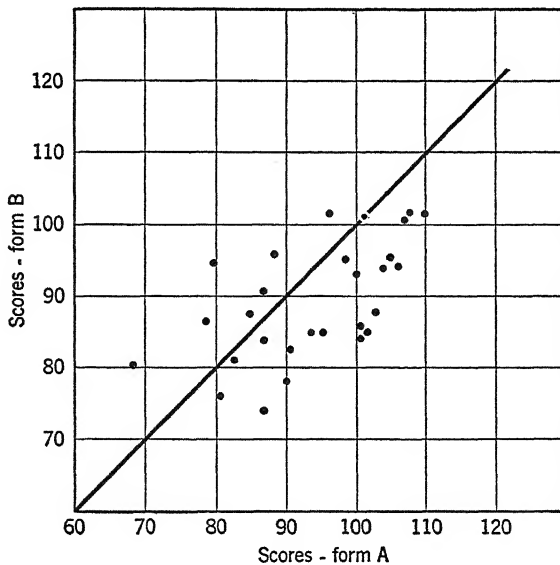
Figure 40. Scatter Diagram Each dot is a pupil's score, on Form *A*, read on the horizontal line; on Form *B*, on the vertical line. Here, $r = +.57$.
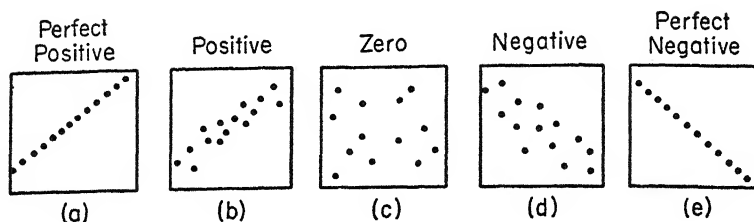
Figure 41. Positive and Negative Correlation Shown by Scatter Diagrams Hypothetical cases (read as in Figure 40) to show the meaning of possible variations. (From L. L. Thurstone, *The Fundamentals of Statistics*, 1925, Fig. 36. By permission of the Macmillan Company, publishers.)

relation is usually assumed unless there is some evidence to the contrary, though sometimes the "line of best fit" through the dots is not a straight line but a curve, and in such cases the correlation is referred to as *curvilinear*.

An added value of the scatter diagram is that it makes possible an analysis of the scores. For example, it calls attention to the deviates. A dot by itself away from the rest, if not due to an error, may indicate that the child who made that score is so unlike the rest that he needs special attention of some sort, perhaps encouragement, or individual instruction.

5. Units of Measurement—Scores

Raw Scores and Marks. As has been stated, the method of marking tests on the basis of the percentage of the items correct, and referring this number to an arbitrary passing mark, is definitely outmoded, though it would be possible to find places where it is still in use. Instead, the number of items correct (weighted in some way if so desired) is used as a so-called raw score, and marks are assigned, if need be, in relation to the other scores. Thus the highest-scoring student might get 25 per cent of the items wrong and still receive the top mark.

The matter of assigning marks, however, still remains a matter of judgment, though the basis for the judgment is objective and is to be found in the distribution of scores as it approximates the normal curve. It should be said, however, that a teacher should not be bound rigidly by any system of assigning A's, B's, and C's, partly because a small group of scores may not distribute themselves at all closely to the normal curve, and also because a "passing mark," as well as a letter

grade, is an arbitrary thing and may have different consequences in different situations. For example, if a failure in a course would keep a pupil from graduating, more factors than the distribution of scores in one class should be taken into account.

Different systems are used for dividing the distribution into segments for assigning class marks. Some follow a percentage system. According to one of these schemes the upper 6 per cent of the pupils are given A, the next 22 per cent B, the middle 44 per cent C, the next 22 per cent are given D, and the lower 6 per cent E. The distribution of marks can also be made on the basis of an arbitrarily determined fraction of the standard deviation (or σ) and percentages assigned, when the distribution is assumed to be normal. A method of distributing class marks using .5 of the standard deviation is shown in Figure 42.

It will be noted that the percentages into which the distribution is divided are quite close to those given above. But the variation might make a good deal of difference to individual pupils, some of whom might pass or fail according to whether one or the other system is used. As a matter of fact, a study of the actual marks assigned in different institutions reveals considerable variability. The number of failures
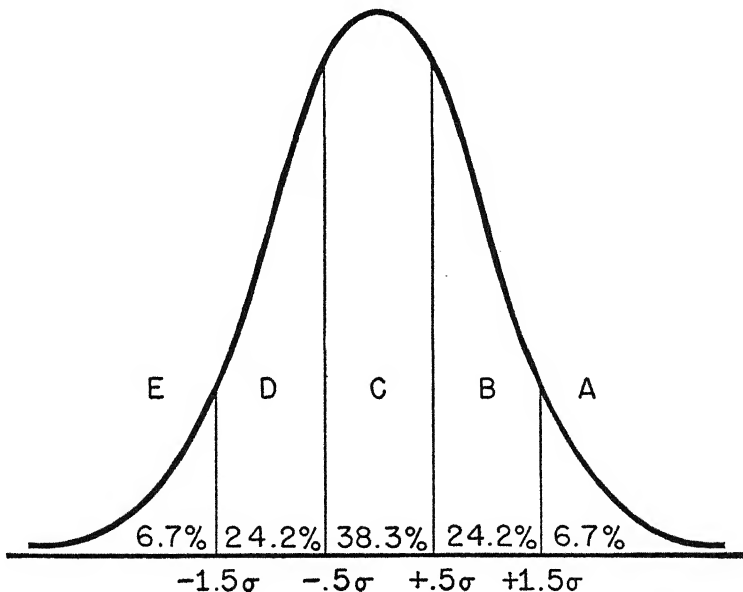
Figure 42. Distribution of Class Marks Using .5σ

varies with individual teachers, departments, and schools. By and large, a smaller number of E's than A's are given.

Figures 43 shows two samples of how marks may actually be distributed in practice. The heights of the columns represent the percentage
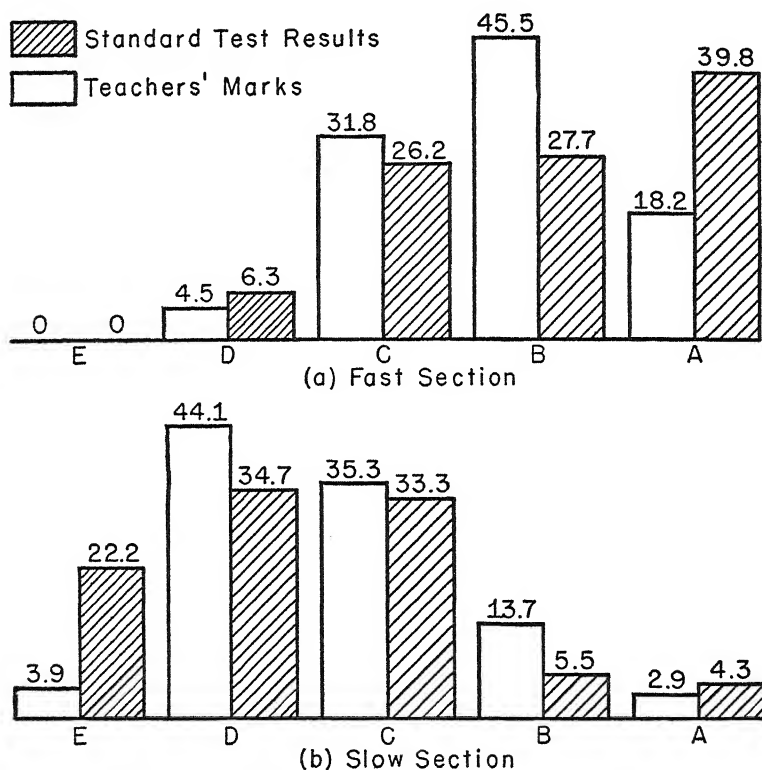
Figure 43. A Comparison of Standard Test Results and Teachers' Marks in Two Eighth-Grade Sections   The figures at the tops of the columns represent the per cent of pupils in each. (R. J. Gatien, "Relation of Teachers' Marks and Achievement Test Results," Unpublished study, 1938. By permission of the author.)

of pupils receiving each mark in a fast and a slow section of the eighth grade. The cross-hatched columns, derived from scores on standardized achievement tests, are given as a basis for comparison with the distribution of teachers' marks. The marks for the achievement scores were obtained by dividing the total range of scores of the 12 sections of the grade by 5 and finding the percentage of pupils in each section whose

scores were in each fifth. Note that in (*a*), Figure 43, the distribution of the test scores of the bright pupils is skewed to the left with no E's, but that the teachers' marks force the distribution into a resemblance to the normal curve. In (*b*), the distribution of test scores is skewed to the right, and the percentage of E's about equals that of the A's, as the marks were awarded, but the large number of D's, and also the E's in the standard test, suggest that something besides the scholarship factor was influential in determining these marks.

Standard Scores. The standard deviation is also used as a basis for such derived measures as standard- or z-scores and T-scores. When a person takes, say, two tests, he gets two different raw scores, perhaps 58 on Test A and 96 on Test B. It would be convenient to reduce these to a common basis so as to discover which one he did better on. It might be that a score of 58, though a smaller number, is actually near the top of the scores for Test A, while 96 might be down near the mean for Test B.

Since σ represents a part of the range of scores, it is a distance that can be marked off on each side of the mean. And if the distribution is assumed to be normal, we know that a distance of 1σ to the right $(+1\sigma)$ plus 1σ to the left (-1σ) would include approximately two-thirds, or 68 per cent, of the scores. The score at the $+ 1\sigma$ point (the mean plus 1σ) would be called a score of 1σ, the mean plus 2σ would be a score of 2σ, and similarly for negative and fractional (tenths of sigma) values (see Figure 44).

For example, in the distribution shown in Table 8, $\sigma = 7.6$ score points. The mean is 63.2. Thus, if the distribution were normal, 68.2 per cent, or a little more than ⅔, of the scores would lie between 70.8 and 55.6 (70.8 is 63.2 plus 7.6 and 55.6 is 63.2 minus 7.6). Of the remaining ⅓, half would be found above 70.8 and half would be found below 55.6. As a matter of fact, between 55 and 70 there are 20 scores, which is approximately ⅔ of the distribution.

In this example, 70.8 $(+1\sigma)$ corresponds to a standard score, or z-score, of 1.00; 55.6 (-1σ), to a standard or z-score of -1.00. Similarly, a score of 2.00 would be 2×7.6, or 15.2 added to the mean, or 78.4. Likewise a score of $.5\sigma$ would be .5 of 7.6, or 3.8, added to the mean, or 67.

Figure 44 shows how the plus and minus sigma points divide the distribution, with the approximate percentage of scores in each part. Thus, in a normal distribution, a score of $+1\sigma$ or 1.00 would be at the 84.1 percentile point, of $+2\sigma$ or 2.00 at the 97.7 point, and so on.

For convenience the mean is sometimes arbitrarily assigned the number 50; $+1\sigma$, 60; $+2\sigma$, 70; $+3\sigma$, 80; -1σ, 40; -2σ, 30; and -3σ, 20. Tenths of sigma can thus be represented as whole numbers: $+0.1\sigma$ is 51, -0.1σ is 49, $+1.5\sigma$ is 65, and so on. These assigned numbers are called *T-scores*. When these are furnished with tests, any raw or actual score may easily be translated into this convenient form. When they are not, a table of T-scores can be drawn up fairly easily.
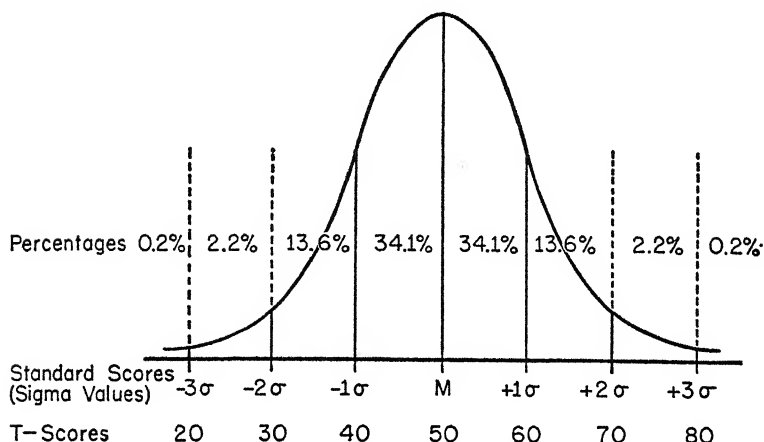
Figure 44. *Approximate Percentages of a Normal Distribution Included within Sigma Distances from the Mean* T-scores are written below each sigma value.

When raw scores are translated into T-scores, it will be found that a T-score of 80 is very high, one of 60 good, one of 30 low. On the basis of σ scores as has been shown (Figure 43) a systematic though arbitrary method of assigning letter marks may be employed.

Percentile Scores. A distribution can be divided in any convenient fashion: into fifths by quintiles, into tenths by deciles, or, in the case of large groups, into hundredths by centiles, also called percentiles. It is quite common practice to give a child a *percentile score* or rating, which indicates the actual percentage of children who were below him in a large group. The manner of finding these points is similar to the method of finding the median and the Q.

For a fairly close approximation, these other positions may be read from a *percentile curve*, as in Figure 45, which can be plotted from the high and low scores, the two quartile points, and the median.

From such a curve, if carefully drawn on cross-section paper, it is possible to discover with close approximation to the computed percentile score what the percentile ranking of any score is, and hence its relative position in the group. For example, a child may have scored 80 on the test, and want to know how good that is. One can find the score 80 on the vertical line, follow horizontally along from that point to the curve, and directly below that point on the line read 16 per cent.

This means that approximately 16 per cent of the group is below him but 84 per cent is ahead of him, or that he is in the lowest one-sixth of the group.

Percentile scores are probably more frequently used than T-scores, perhaps because they are supposed to be easier to understand. It may be that, since 70 was so long used as a "passing" mark and 100 for perfect in school marking systems, it is harder to realize that a T-score of 70 is as high a mark as a percentile rank of 98. There is a real disadvantage in using the percentile score, however, especially when scores tend to follow the frequency curve instead of being scattered along evenly from the bottom to the top. The upper and lower 10 per cent of a group of scores, distributed normally, cover a much

Figure 45. Percentile Curve Drawn as the Line of Best Fit through the Quartile Points Quartile points are shown by the large dots; the computed decile points are inserted to show the closeness of the approximation.

wider range than the 10 per cent near the mean. This can be noted from the percentile curve shown in Figure 45. If percentile scores are used, it is important to realize this fact in interpreting them. Differences in percentile scores at the extremes of the range should be interpreted as representing greater differences in actual score points than the same differences near the center.

Age and Grade Scores. Two other units of measurement of pupil progress are commonly used for presenting the results of standardized achievement tests particularly at the elementary-school level. One of them, *educational age,* corresponds to the mental-age score obtained

from the Stanford-Binet Intelligence Examination. The average performance of a large number of children of each age is taken as a norm, and any child that scores at one of these levels is said to have an educational age at that level. The scores for separate subjects and a composite achievement score are read from tables of norms that are furnished with the published tests. So a child of nine years might have an eight-year arithmetic age; or from a composite test of achievement in all the school subjects it might be found that he had an educational age of eight years and four months. Also, following a formula analogous to MA/CA = IQ, an *educational quotient* is sometimes computed by dividing the educational age by the chronological age in order to throw light on a pupil's stage of educational development. Like the IQ, an EQ below 100 indicates retarded development, while an EQ above 100 shows accelerated educational progress. An accomplishment quotient (AQ) is sometimes computed also, by dividing EA by MA (or EQ by IQ), though the value of this concept is somewhat dubious.

Grade scores are also obtained from the standardized achievement test making it possible to compare the educational achievement of a child with the average of his grade. For example, a child in the fifth grade might be reading at the third- or fourth-grade level, or it might be said that his reading accomplishment is measured at 4–2, since the grade scores are also divided into units of months. This score is useful for teachers, who, for example, sometimes report the progress of remedial cases in this way. Thus a child might be found to have improved from third- to fifth-grade reading ability in one year. The norm of performance for any one grade, however, is a somewhat arbitrary standard since school promotion policies differ so widely.

The various kinds of scores described are all convenient devices for converting a raw score into something more meaningful. They make it possible to compare a pupil's performance on one test with that on another and with the achievement of pupils of comparable ability. They therefore constitute a useful set of tools for the teacher as evaluator.

6. The Standardized Test

Comparison with Teacher-Made Tests. In the discussion thus far, various devices have been described that make tests more objective and hence more dependable and useful instruments. Many of these devices can be employed by teachers who are specialists in different subject-matter areas in constructing their own tests. The teacher-made, short-answer tests have certain advantages that are not claimed for the

published, standardized tests in the different subject-matter fields. The two are both valuable for different purposes. The teacher-made tests are readily adaptable to any section of a subject on which it seems advisable to test the students, and can be so constructed as to reflect the emphases given in harmony with the instructional objectives. The standardized test may not do this, and may even call for knowledge not included in the work pursued. Furthermore, the standardized tests are expensive, and they cannot be used to advantage on the same group a second time to test for growth when different forms are not available.

On the other hand, the standardized tests make comparisons possible between the work of students in different grades and in different institutions, particularly in subject-matter fields that have been fairly well established for a number of years. In this respect, tests in arithmetic would yield more dependable comparisons than those in the social studies, for in the latter there is still considerable disagreement over the proper nature of the course content. However, the fears some people used to have that the standardized test would "standardize" the pupils were hardly well founded. It merely yields a measure that indicates their level of performance on a particular scale in comparison with that of others on the same scale.

Apart from such limitations as those mentioned, the standardized tests have the same advantages as the teacher-made, short-answer tests and others beside. These additional advantages will be briefly pointed out, and in the process the characteristics of the standardized test will be revealed.

Standardized Tasks. All pupils taking the same test are given the same wide sampling of questions to answer. The standardized task thus provides a constant situation on the basis of which individual performances can be compared. Many tests are available in a number of equivalent forms. These are so constructed that a pupil will get practically the same score on any one of them since the questions are of the same sort and about equally difficult. Different forms of the same test correlate usually from .85 to .95 with each other.

Standardized Administration. Not only are the tasks standardized, but so also is the method of administering the tests. The directions are the same each time the test is given, and the time allotment is constant. As has been stated earlier, unskilled examiners are sometimes apt to feel that they should give the child a little help, which, of course, destroys the value of the test, for one cannot compare the performance of children if some of them have been given the directions properly while

others have received a little gratuitous tutoring on the side. Similarly, the method of scoring is standardized. This means that the answer for each item has been agreed upon previously, and hence any person trained in scoring papers would arrive at the same result as any other person similarly qualified. However, just anybody cannot administer tests, particularly the individual examinations like the Stanford-Binet, though some group tests have been made pretty nearly fool-proof. Training and experience are particularly important in the selection of tests to be used for different purposes and for their interpretation.

Norms. If a test is given to the pupils of a certain school or grade, it is possible, as we have seen, to compare the performance of any one child with the rest of his group. However, there is really no means of knowing whether his group is inferior or superior as compared with those in other schools in other localities unless norms are furnished with the test. Norms are scores obtained by large numbers of pupils in different localities upon whom the test has been tried before it is offered to the public. They may be in the form of averages and deviations, of decile, percentile, or T-scores, or of age or grade scores.

Grade norms are average performances, sometimes supplemented by measures of variability, for a large number of children of the several grades. From such a list one might read that the median score for the ninth grade, on the basis of the 750 ninth-grade pupils tested in May, is 95. Now, the ninth grade which has just been given this test shows a median score of 84. So the child who got 97, instead of being very superior, is only about the average of the pupils of that grade. In some cases, tables of grade norms divided into fractions of a year are presented. Similarly, age norms may be furnished. In this case, the median or the mean scores of pupils of different mental or chronological age levels are given, and the same kind of comparisons can be made.

Reliability of a Test. If a tailor in cutting out cloth for a suit used a new tape measure on one day and on the next an old one which had stretched, the pieces of cloth would not fit together. The yard of cloth he cut the first day, on the second might seem to be 35 inches long. Or, if the measure had been left out overnight in the rain, it might have shrunk an inch so that the yard of cloth would now be read as 37 inches. An elastic band, in other words, would not do as a measure, because, somewhat after the fashion of the happenings in *Alice in Wonderland*, the same person would appear to be now tall, now short, owing to the erratic nature of the measuring device. Ridiculous as this analogy seems, spring scales and dollar values furnish parallel examples.

Such elasticity is an ever present danger in test and scale construction. Many a promising scale has been found to report one result when it is tried the first time and another when it has been tried a second time, on the same group of people. Of course, it may be said that they would do better the second time because of practice, but sometimes the score is lower the second time. Reliability is the technical name given to that quality a scale possesses when two administrations tend to yield the same results. Thus the word here has a technical meaning and does not refer to just any kind of dependability.

The reliability of a scale may be determined in various ways; one has already been spoken of—it may be given to the same group twice. The two sets of scores may then be correlated. The result is called the *coefficient of reliability*. If this coefficient of reliability is .80 or above, the test is considered sufficiently reliable for effective use. Other methods of finding the reliability of a test are to correlate the scores of the first half of the questions with those of the second half, or the odd-numbered with the even-numbered questions, or one form of the test with an equivalent form.

Validity of a Test. Another necessary characteristic of a good test, whether standardized or not, is that of validity. The task of providing valid measures is not so great in ordinary mensuration: a yardstick is under no temptation to measure your weight nor a balance to measure your height. But the validity of most teacher-made tests is open to question, particularly those of the essay type, as has been shown. The validity of standardized tests, however, has been checked in some way before they are offered for sale. The correlation of the test with a criterion is a matter of record, and results are interpreted accordingly.

Uses of Standardized Tests. Various kinds of standardized achievement tests have been mentioned in this chapter only incidentally since they are described in more detail in connection with the psychological processes they are intended to measure. In general, it may be said that the standardized achievement tests tend to represent the different school subjects and to adapt to different levels of ability from nursery school through the university. At the elementary level, the fundamental processes have received the largest amount of attention from test makers, with reading probably coming first and arithmetic second. Achievement batteries are widely used as a part of the routine testing program in many city and state school systems, taking the better part of a day to complete, and giving for each pupil a group of scores on the basis of which his progress in the different subjects can be followed. At the high-school

and college levels, standardized achievement tests have been devised for the regular school subjects—mathematics, sciences, languages, and the arts; and test batteries have been assembled to furnish an inventory of the abilities of students for purposes of educational and vocational guidance.

The coverage of the academic subjects by standardized tests is both a source of strength and of weakness. The values are evident, for the tests provide a clear picture of how individuals and groups stand in relation to others in the areas of knowledge and skill taught in the schools. They are impersonal and impartial, and reveal strengths and weaknesses that often must be objectively viewed in making life decisions. But, on the other hand, they tend to be traditional in their emphasis on verbal or symbolic knowledge to the neglect of other educational outcomes which may sometimes be more important. Teachers who desire to have their pupils make a good showing are tempted to drill them on the kind of subject matter known to be emphasized by the tests used. The usual short-answer forms make fact-testing easy, with the pupil relieved of all responsibility except to spot the right answers for the items.

The place to start in achievement testing, as stated earlier, and repeated here for emphasis, is with the objectives of instruction. If the standardized test adequately measures the kinds of changes it is desired to make in pupils doing work in a particular grade or course or subject, then that test is all that is needed. But if there are other objectives that are not represented on the test—such, for example, as the development of intellectual curiosity, of willingness and competence in group discussion, of enjoyment and satisfaction in intellectual and esthetic activities, and of the ability to think rationally and solve practical problems—then other methods of evaluation are needed. The standardized test still has its part to play, but it is only a part, to be used for what it is intended for. It should be pointed out, however, that some standardized tests emphasize other than knowledge outcomes, and that new kinds of tests are constantly being devised to meet varied educational objectives.

Two movements have for some time been under way which seek to enlarge the sphere of measurement and make it more effective than it was in its earlier stages. One of these, *evaluation*, may be said to refer primarily to the school program; the other, *guidance*, to the direction of the individual child. Evaluation programs have been instituted in a number of schools. These involve a formulation of the goals of the school program in its various parts, followed by an appraisal of what is actually being done, using such standardized instruments as are available. Two evaluation programs, the Eight Year Study and the New York

State Survey[6] are illustrations of what can be done on a large scale, and their influence has extended far beyond the limits of the schools evaluated. The programs of individual schools or school systems can be evaluated on a smaller scale, however, and such standardized measures and others as may be needed are used to determine the extent to which their objectives are being attained, and, further, to set up procedures on the basis of which a better job can be done.

Measurement is likewise necessary as a part of any effective guidance program. The factors described in the earlier chapters of this volume —the background of the pupils, their needs and frustrations, their evasions, rationalizations, and the like—are very important in understanding and in helping to guide the educational, vocational, and what may be called the life choices of pupils. Individual conferences are necessary to obtain much of the needed information, and objective scores on standardized tests of intelligence and achievement are an invaluable supplement. Both evaluation and guidance imply an extension of measurement by the use of new instruments in new fields and call for an even greater degree of knowledge and competence on the part of teachers than has been necessary in the past in order that the educational program may more and more effectively meet the changing needs of children and youth in a changing society.

In Summary

The measurement movement in education is a part of the quest for exact knowledge that developed the sciences from their early beginnings in natural philosophy. Much good thinking went into the problem of what should be learned, but until the present century very little effort was spent in finding out how much of what is desirable to learn was actually learned. As a consequence of the scientific approach, scoring methods, criteria of success and failure, and the examinations themselves approach real objectivity. Check lists, scaled samples, and short-answer forms are used, and the essay examination itself is subjected to scrutiny.

The criterion of objective comparison of individual scores and group performance, as well as group comparisons, call for the use of statistical concepts. Measures of central tendencies of scores, their variabilities, and graphical representations serve to conceptualize the structure of the relationships among groups of scores, while the correlation technique quantifies the relationships between abilities, capacities, and other vari-

[6] W. M. Aikin. *The Story of the Eight-Year Study*, New York: Harper, 1942; New York State Regents' Inquiry, *Education for American Life,* New York: McGraw-Hill, 1938.

ables. Raw scores are supplemented by other units of measurement based on the percentage scale, the standard deviation, and age and grade norms in order to indicate more clearly the level of an individual performance in relation to that of comparable groups.

Teacher-made tests are constructed with proper regard for objective scoring and helpful interpretation, but standardized tests, though less flexible, are more satisfactory for appraising pupil achievement. With their computed reliability and validity, and with their tables of norms, they are indispensable for research purposes and for school programs of evaluation and individual guidance.

Questions

1. What light does the concept of probability throw upon Kretschmer's work? Jung's introvert and extrovert types?
2. Select some chapter or topic from your major subject, or one you are planning to teach, and construct an objective-type examination on it.
3. What standardized tests are available in the field of your specialization? By whom were they constructed? Published? What advantages do some of them have over others?
4. Administer some achievement tests to yourself, to your friends, or to others. Score, and compare the results with the published norms. How do you account for any discrepancies?
5. For what purposes is Q used? SD?
6. In what ways might the intelligence of two groups of pupils be compared?
7. What is a valid test? How is validity determined?
8. Explain the relation of course objectives to evaluation.

Readings

Buros, O. K. (Ed.) *The Mental Measurements Yearbooks.* Highland Park, New Jersey, 1938, 1940, 1949 (New Brunswick, N. J.: Rutgers University Press).

These handbooks report reviews and critical studies of standardized tests and provide an invaluable aid in their evaluation.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology.* New York: Harper, 1937.

The well-known study by Starch and Elliott on reliability in the grading of high-school work in English and mathematics (p. 182), a paper on the reliability of examinations (p. 189), and one on the suggestion effects of true-false tests (p. 199).

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.
Chapter XIX develops and illustrates in detail some of the more significant matters in regard to educational measurements.

A number of volumes present the subject of statistics as applied to psychological and educational data on various levels of difficulty and requiring varying amounts of mathematical proficiency:

Elementary Level

Broom, M. E. *Educational Statistics for Beginning Students*. New York: American Book, 1936.
Good, W. E. *An Introduction to Statistics*. Ann Arbor, Michigan: The Ann Arbor Press, 1944.
Odell, C. W. *Introduction to Educational Statistics*. New York: Prentice-Hall, 1946.
Thurstone, L. L. *Fundamentals of Statistics*. New York: Macmillan, 1925.

Medium Level

Garrett, H. E. *Statistics in Psychology and Education*. New York: Longmans, Green, 1937.
Guilford, J. P. *Fundamental Statistics in Psychology and Education*. New York: McGraw-Hill, 1942.
Lindquist, E. F. *A First Course in Statistics*. Boston: Houghton Mifflin, 1938.

Advanced Level

Burt, C. *The Factors of the Mind: An Introduction to Factor Analysis in Psychology*. London: University of London Press, 1940.
Guilford, J. P. *Psychometric Methods*. New York: McGraw-Hill, 1936.
Lindquist, E. F. *Statistical Analysis in Educational Research*. Boston: Houghton Mifflin, 1940.
Peters, C. C., and W. R. Van Voorhis. *Statistical Procedures and Their Mathematical Bases*. New York: McGraw-Hill, 1940.

The following volumes discuss the principles of testing and measurement with a wealth of illustrative detail:

Broom, M. E. *Educational Measurements in Elementary School*. New York: McGraw-Hill, 1939.
Greene, E. B. *Measurements of Human Behavior*. New York: Odyssey Press, 1941.
Greene, H. A., and A. N. Jorgensen. *The Use and Interpretation of Elementary School Tests*. New York: Longmans, Green, 1935.

Greene, H. A., and A. N. Jorgensen. *The Use and Interpretation of High School Tests.* New York: Longmans, Green, 1936.

McCall, W. A. *Measurement.* New York: Macmillan, 1939.

National Society for the Study of Education. *The Measurement of Understanding. (Forty-fifth Yearbook, Part I.)* Chicago: University of Chicago Press, 1946.

Remmers, H. H., and N. L. Gage. *Educational Measurement and Evaluation.* New York: Harper, 1943.

Tiegs, E. W. *Tests and Measurements in the Improvement of Learning.* Boston: Houghton Mifflin, 1939.

Travers, R. M. W. *How to Make Objective Tests of Achievement.* New York: Odyssey, 1950.

Learning Processes

THOUGH the details and emphases vary, the processes involved in learning are the same for young and old, for stupid and bright, and for people in all kinds of situations. Beginning with an analysis of the interaction of teachers and pupils with their structured environments, presented in Part 1, we have inquired into the dynamics of behavior in Part 2, and the progress of change and its measurement in physical growth, intelligence, and school achievement in Part 3.

We now examine more closely into the changes in individuals that take place through learning. The factors described thus far are now assumed to have been attended to. Teachers and pupils are normally adjusted to a satisfactory environment, the latter are not showing frustration responses since they are working at tasks within the range of their interests and of their abilities as measured. Now we are ready to examine the way these children learn; knowing this, we can the better select our techniques and adapt them to the job in hand.

In the satisfaction of felt needs, general or specific, the individual responds to what he perceives or to what he thinks of, though it may not be what the person next him responds to. A learner learns what to perceive under certain circumstances—what are the appropriate things to respond to (selectivity). He also learns how to make the appropriate responses correctly and at the right time (associative learning). There are many situations in which he does not know the right response, so he learns how to find it (problem-solving), and at least some of what he has learned he has available for future use (retention). These processes will now be examined. Their application to specific learning situations will be the subject of Part 5.

Selectivity: Percept and Concept

Kinds of Learning. Human beings are far superior to all lower animals in their capacity for learning. They can distinguish more complex patterns of stimuli to which to respond; they can make more complicated responses; they can associate past experiences symbolically; and they can learn to create new and even marvelous things. As they grow from infancy to maturity, their abilities increase enormously, and they may be enhanced by experiences especially provided.

As the individual modifies his responses to different aspects of his environment, he is learning. Much of the learning is relatively undirected and unsystematic as when one learns to speak his native tongue. Much is carried forward informally through the influence of parents and friends, as when one learns the correct thing to say under varying circumstances. Much, however, is not carried on thus incidentally, but requires special assistance, as when one learns to read and write, to speak a foreign language, or to do problems in arithmetic. The cultural heritage is too precious and also too complex to have its transmission left to the chance operation of incidental acquisition. So societies have set aside parts of themselves (the schools) to function as selectors, transmitters, and adapters of this heritage. Each generation must subject itself to modifications through the changes that take place in each individual, the activity of whose neurons and muscle fibers must be changed if he is to survive and live a life that is satisfying to himself and to others.

No matter what is learned, the process of learning is fundamentally the same whether or not it is carried on incidentally. It will be convenient, however, to consider certain aspects or kinds of learning one

at a time in order that the process may be better understood. If the teacher understands the process, pupil learning is more efficient, and there is some assurance that the modifications of behavior sought may actually be obtained.

The next four chapters will deal with four aspects of learning: (1) selectivity, the percept and concept, the process of responding to part of a situation, or a pattern of related parts; (2) association and conditioning, or learning to make familiar responses to stimuli that have not previously elicited them; (3) thinking and problem-solving, or discovering and selecting responses appropriate to new arrangements or patterns of stimuli; and (4) the availability of past experience through retention and transfer, dealing with the effectiveness of previous learning in subsequent situations.

1. SENSING AND SENSORY DISCRIMINATION

The Senses. Although learning is largely a process of finding out what to do in different situations, the process of determining what the situations are and how they differ tends to be neglected. True, there has been a great deal of experimental exploration of the various sense avenues and of the various phenomena of the different senses. These turn out to be considerably more than five in number. They may be listed as follows:

> visual (sight)—chromatic, achromatic
> auditory (hearing)
> olfactory (smell)
> gustatory (taste)—sweet, sour, bitter, salt
> kinesthetic (muscular position and strain)
> static (balance)
> tactile (touch)
> epicritic (light pressure)
> protopathic (deep pressure)
> pain
> organic

However, those of chief concern in learning are the visual, auditory, and kinesthetic, with perhaps the static added for body orientation in some of the motor skills.

The Stimulus. The sense organs are sensitive to different forms of energy, but not to all (magnetic waves, for example), and when the energy is present in sufficient intensity it sets up a nerve current which,

when transmitted to the brain, produces a sensation. Apparently, whatever energy will stimulate a particular sense organ produces the sensation that that sense organ is set up to handle. The true nature of the stimulus is therefore something of a mystery, for all we have to go by is the familiar set of sense experiences. While scientists continue their explorations of the infinitely small and infinitely distant, however, common man has plenty to do to deal with what is "right before his face and eyes."

The term stimulus in its restricted meaning applies to a physical force (e.g., light or sound waves), which set up a nerve current in a sensory end-organ. It is conveniently used in a more general sense, also, to apply to any pattern of events more adequately designated by the cumbersome term, stimulus situation or stimulus pattern. In the first case Koffka's differentiating term, proximal stimuli, might be used, to which the response is "molecular," that is, of parts, of the organism and within it; for the latter, the corresponding term, distal stimuli, is applicable, to which the response is "molar," that is, of the mass, or organism as a whole, and takes place in an external environment.

The stimulus or stimulus situation—for the terms will be used interchangeably to refer to environmental objects or patterns—is the key to the nature of the response made by the organism. It may be thought of as setting off the response, much as a trigger discharges the gun. The energy is in the organism, but it is released by the stimulus acting through the sense organs. Or it may be thought of as the signal or badge which calls out one kind of response rather than another. But the process by which one stimulus is responded to rather than another is quite complicated, as we shall see.

"Tabula Rasa." According to an axiom of an older philosophy, "There is nothing in the mind that was not previously in the senses." In other words, all mental content is derived from sensory experience. The mind, it once was believed, is originally like a "tabula rasa," or a wax tablet, a blank sheet of paper upon which experiences write. While greater importance than formerly is now attached to the dynamic aspects of the organism—the drive and "going out after" experience, as it were—there is nevertheless considerable truth in the simile, which is not minimized by the fact that persons have been born and have lived to maturity whose contact with the external world has been seriously impaired. Helen Keller has enviable achievements to her credit in spite of being shut off from the world of sight and sound. But if, in addition to this, one were unable to smell or taste; and if, moreover, the static, kinesthetic,

and organic, and other senses were inoperative, the human body would be but an inert mass, incapable of perception, knowledge, and practically all coordinated movement. The different sense organs not only establish contact with the world, but they also analyze the environment through the various sensory channels, thus effecting a diversification of activity which otherwise would be quite impossible.

Things seen and heard and felt serve to direct and control the responses made. Hence the followers of the philosophic axiom quoted above inferred that the chief task of education was to train the senses so that the mental content derived from them might be as correct and perfect as possible. Added theoretical backing was given this view in the intuitions of Rousseau, who contended that the senses as well as the other members are implements of intelligence and should therefore be exercised: the child should be allowed the freedom of his spontaneous nature to see and hear and to handle things, and so learn to judge and compare. And it was strengthened by the Herbartian doctrine that the "presentations" of the environment are the determiners of the mind.

Sense Training. The theory that sense training is basic, educationally, received substantial support from the experience of Itard, Séguin, and Montessori. Itard (1775–1838), who for many years was physician to the National Institution for the Deaf and Dumb in Paris, worked with the eleven-year-old "savage of Aveyron," a wild boy who had been found by some hunters in the forests, a real Mowgli, living the life of the beasts. Over a period of four years, Itard tried vainly, by training his senses, to educate him, little realizing the richness of sensory experience the boy had had, nor suspecting that he was an idiot. Improvement was so marked, however, that Séguin (1812–1880), though he was but a lad when the experiment was concluded, became interested in the history of the case through Itard himself, and developed the so-called "physiological method" for the education of idiots. The Séguin Form Board is still a part of any well-equipped psychological laboratory. Sounds, colors, dimensions, and classifications were taught through the meanings attached to the objects represented and derived from some need the child felt or some use to which the object could be put.

Madame Maria Montessori, who, during her visit to America in 1915, inspired the so-called Dalton plan of individualized instruction, was herself a physician, like Itard and Séguin, and a careful student of their work. While her contributions, like those of Froebel, the founder of the kindergarten, have now become merged with a less formalistic educational theory, her influence is still to be found in many of the activities

of the present-day nursery school and kindergarten. To apply one of her cardinal principles, education through the senses and muscles, she devised much interesting apparatus—frames for lacing, buttoning, and hooking, geometric insets of wood that children might gain a knowledge of form, and a cut-out alphabet covered with fine sandpaper, that they might learn the shape of the letters tactually and kinesthetically as well as visually.

Some of this apparatus is now used to test performance and some as play material. Teachers of young children objected to her minute directions for its use, as they did earlier to the meticulous handling of the Froebelian "gifts and occupations." Their use is not to train the senses as such, but rather to furnish simplified mental experience. They provide opportunities to select, abstract, and compare certain objects which are themselves so simple as to allow their other attributes to go unnoticed. The result is the building-up of concepts of hard, soft, rough, smooth, heavy, light, and so on, which is as much perceptual or discriminatory as it is a purely sensory process.

Discrimination of Small Differences. Sensory discrimination, as distinguished from the identification of perceptual patterns, involves differentiating between different degrees of the attributes of sensory experiences such as quality, including colors, pitch, tastes, smells, temperature, smoothness, and the like; intensity, including brightness, loudness, pressures, weights, and the like; size; and duration.

A number of careful laboratory experiments have been performed to discover how fine the discriminatory ability is in these different areas. Pioneer work in this field was performed in Germany by Weber and by Fechner, who applied the term *psychophysics* to it, since it seemed to be a study of relationships between the psychic (mental) and the physical world. The "just noticeable difference," abbreviated JND, has been sought in various series of intensities of weights and lights, lengths of lines, etc., and the amount of increase or difference as objectively measured was determined for each change or increment that was subjectively noted.

Weber's law may be stated as follows: In comparing magnitudes it is not the arithmetical difference, but the ratio of magnitudes, that is perceived. In general, this means that the differences between large objects or intensities have to be greater, if the differences are to be noticed, than is the case with smaller ones. An analogous situation occurs in the price of articles. A ten-cent increase in the price of a twenty-cent article would be apt to be resented more than a ten-cent increase in the price of a five-dollar purchase.

Comparisons have likewise been made in the percentage of correct repeated judgments of very small differences made by the same individual (internal consistency) and the percentage of correct single judgments made by a number of different individuals (external consistency).

While the capacity for fine discrimination is of occasional significance in other than the visual and auditory senses, as for example with tea tasters, these two senses are primarily depended on for the control of motor responses facilitating adjustment. Defects of the visual and auditory receptors, of course, call for special attention (Chapter VIII). But when the end-organs are normal, it is possible to learn to make still finer discriminations. In some cases, as, for example, in the comparative size of objects, or the duration of events, this is unnecessary since accurate instruments have been devised for the purpose.

However, in many phases of learning, fine sensory discriminations are necessary—in estimates of distance and time in many sports, in color differences in art, and the discrimination of pitch, time, loudness, and rhythm in music. The question of the extent to which the ability to make these discriminations is innate and the extent to which it is acquired raises the old nature-nurture problem. It is certain that there are individual differences, and that children improve as they grow older. In many cases, more rapid improvement than would ordinarily be expected has been made with training.

2. The Prepotent Stimulus

The Nature of the Stimulus. Even in the psychological laboratory, where efforts are made to control them, separate stimuli are not found in isolation. In ordinary experience great numbers of external forces are beating on all the receptors at once. All kinds of sights, sounds, pressures, and smells are present to the senses. However, a selective process, called *attending*, is also in operation that acts in such a way as to allow an individual to focus on only a relatively small number of separate items at any one time. What are the conditions that serve to pick out certain stimuli to be responded to while others are neglected? It is obvious that the nature of the stimulus itself is one of the most important factors.

If someone is speaking when a loud crash is heard in the back of the room, the audience will be likely to attend to the noise instead of to the speaker because of its greater *intensity*. Similarly, bright lights, oppressive odors, severe pains, loud voices, and the like make it difficult for those who experience them to attend to anything else. Such stimuli are more powerful in attracting attention or in calling out a response to them. Hence they are said to be *prepotent stimuli*.

Similarly, an object of unusual *size* or huge mass, like an elephant, a tall building, a full-page display advertisement, or a large headline or poster, other things being equal, will have a prepotent effect, and lesser objects may remain unnoticed.

Changes and contrasts in intensity, color, rhythm, and the like also serve to cause individuals to attend. A person who speaks with a well-modulated voice is "easier to listen to" than one who remains monotonously on the same pitch and continues without emphasizing any words or phrases. Different colors set over against each other, extremes of any quality, unusual objects, and the like are almost automatically discriminated from a homogeneous mass of stimuli.

As a rule, objects in *motion* are more likely to cause people to attend to them than are objects at rest—speakers who move about or gesticulate, mechanical window displays, flickering electric signs, restless children, motion pictures, and the like. In fact, the popularity of the movies and television is undoubtedly in large part due to their control of both visual and auditory stimuli. One is almost forced to attend to the picture whether he wants to or not!

Experience. The above conditions of prepotency relate to the nature of the stimulus and may be said to be objective in that they are virtually the same for all observers. A part of a total pattern of sensory experience may, however, be singled out from the rest, not because of the nature of the stimulus itself, but because of its significance for a particular observer. If it has some meaning to him as a consequence of his familiarity with it or with related phenomena, he will be apt to attend to it when one not so experienced would not. Thus a physician might note symptoms of disease, a botanist vegetation, a hunter wild creatures, an architect houses, the proof reader errors, and a logician fallacies. Experience with such phenomena has resulted in their being singled out and responded to before, and small differences that others have not had occasion to observe have been previously noted.

A part of the total situation may be selected and responded to because it resembles something that has been experienced before in a different context. Such a response is said to be by *analogy*. Examples might be the door of a house, the handle of an object, the color of the storm clouds, the neatness of a person's clothes, as well as the cooperative behavior of a child, or a disturbance in a schoolroom. The individual may be aware of why he picks out the part to respond to, reasoning that this is what he did before so it ought to work this time. Or he may not realize that he is responding by analogy at all.

When a stimulus is responded to regularly in a certain way, and another stimulus is later responded to by analogy, in the same or similar way, the two are said to be *equivalent stimuli*. So far as the individual is concerned, they are all the same to him! The stimulus may be thought of as a signal, like a bell, for a certain kind of response. And in many cases the differences are immaterial. One goes to the door whether in answer to a bell, a buzzer, or a gong, and whether it rings once or twice. But on a party line the number of rings of the telephone makes a difference. To the Japanese, *r* and *l* are alike, for he does not have to distinguish them in his language; so that, for example, there is no noticeable difference between "lot" and "rot."

In some cases the individual may not even notice the difference in the two stimuli, and, so long as his response is satisfactory, he will go on mistaking the one for the other. Or he may notice the difference in stimuli, but respond to both in the same way. And he may be correct, as in the meaning of the German "und" and the English "and." Or he may be led astray if he thinks that "Bund" means quite the same thing as "band." Words which are the same or nearly the same in two languages are called cognates. They may have the same meaning, but there are often important differences. In all such cases of equivalent stimuli, the part responded to may be practically identical with a former stimulus, but what is perceived and hence responded to may be this part alone, or it may be this part in relation to the new situation, that is, the context.

Purpose. Similarly, those aspects of the environment tend to be noticed which are related in some way to an individual's purposes, needs, or desires. When a person wants to know the time, he will be more apt to notice the clock than the other articles on the mantel shelf. A mother who is concerned about the care of her child will hear his faint cry more promptly than she will many louder noises. A salesman will spot a prospective customer, partly through experience, no doubt, but largely because of his interest in selling goods. One must learn what elements in the environment are of significance in the attainment of his goals; but, once these are known, they will be attended to. Similarly, configurations of stimuli which may block or frustrate the individual in the attainment of his purposes will be noticed.

The educational implications of experience and training and of purpose, which he referred to as the idea in mind at the time, were recognized by the German educational philosopher, Herbart. He used the term *apperception* to include the action of attentive consciousness, called perception, but also the process by which one apprehends the

meaning of a situation. He considered that any new situation is understood in terms of previous experiences or "presentations" of the environment. He therefore listed *preparation* of the mind to receive the new idea as the first of the *five formal steps* in the development of the inductive lesson. The purpose of this step is to gather together the various experiences a child has had or must have in order to understand the point of the lesson, so that the second step, *presentation*, may be taken in context, followed by the third step, the *association* of the new with the old. The fourth step, *system*, is aimed to separate the idea from the concrete factors with which it is associated, what Thorndike called "analysis and abstraction." The child is then ready for the fifth step, *application*, in which he is furnished opportunities to use his newly acquired ideas or concepts.

While present-day psychologists prefer a behavioral to an ideational terminology, it is clear that Herbart was concerned, in part at least, with the fact that different individuals can look at the same "stimulus situation" and see different things to which to respond—according to their point of view. The phrase, *frame of reference,* is sometimes used to apply to the viewpoint one has in looking at things, though the term usually refers less to percepts than to concepts. For example, it applies less to recognizing a rabbit when you see it, and more to your realization as a gardener that the rabbit is something that will eat the vegetables in your garden. The principle, however, is the same, though the pattern in the latter case is enlarged.

Expectancy. What Herbart referred to as the "idea in mind at the time" has a close parallel to what in behavioral terms is the concept of expectancy. What one is thinking about or waiting for is likely to be noticed and promptly responded to when it appears. Expectancy is then an attitude, a readiness to respond to a stimulus when it is later presented. It may be observed in animals around feeding time, as soon as one appears on the scene. It is in itself a response to various internal and external stimuli. But it is not necessarily one of eagerness, as many a teacher can testify. It may be one of waiting resignedly for the accustomed annoyance and a readiness to respond to it in the accustomed way, by aggression, or evasion, or apathy, or in some similar fashion. When, however, the expected stimulus does not appear, or another one does, the response may be appropriate and coordinated, or it may be one of bafflement or frustration as the case may be. The phenomenon of expectancy seems to be a special case of set, which will be discussed in more detail later.

Abstracting Sensory Patterns. The stimulus or pattern of stimuli that is prepotent, whatever the cause of the prepotency, stands out from the rest and is responded to. The response may be no more than momentary attending, or it may be the initiation of a course of action. For the present we are not concerned with the question as to how the individual is going to know what is the thing to do in the presence of the prepotent stimulus, but only with the phenomenon of prepotency itself. Such a stimulus or pattern of stimuli is sometimes referred to as a *figure upon a ground,* the figure being the part of the total situation that is responded to. It is perhaps a particularly lovely flower picked out to be admired from many in a garden, the house that may be purchased, the individual in a crowd who "catches one's eye" for a moment, the typographical error in a line of print, the delicate aria set in an otherwise mediocre opera, the closing whistle heard amid the clank of machinery, the "good deed in a naughty world." All of these and the thousands more are parts of a total of sensory stimuli that are picked out or *abstracted from* the rest. Sometimes the figure to which one responds at least momentarily has no particular significance, sometimes the wrong one is picked out, meaning that the response to it results in dissatisfaction, frustration, maladjustment, or failure. Sometimes, however, the right one is picked out, meaning that the correct response to it results in satisfaction, progress, better adjustment, and success. What is the nature of these figures or patterns, and how may the right ones be picked out or abstracted?

3. SPATIAL PATTERNS

Visual Forms. The visible world is continuously broken down into parts that are separately perceived. Samples of such parts are trees, doors, words, numbers, diagrams, signs, or any other spatial arrangements of recurring, recognizable patterns that have significance. Sometimes such patterns are solid objects that retain their structure no matter how they are moved about in space, such as balls, chairs, or books. Others, like costumes against a particular background, a man working in a garden, or a pupil taking an examination, may come apart, as it were, and the parts be reassembled to form other patterns. The pupil who was taking the examination may next be seen as a part of a pattern of a baseball diamond or a supper table. Letters and numbers undergo constant rearrangements of multifarious significance.

Gestalt. The characteristics of simple visual forms such as lines, polygons, and other figures have been studied intensely by the gestalt

psychologists. Gestalt, a German word which has been variously translated "form," "pattern," "arrangement," and "configuration," refers to the unity or grouping of parts as they are apprehended to form wholes. Two principles which have been previously alluded to, are basic to an understanding of this point of view.[1] One, the *law of field properties,* may be stated as follows: The whole is more than the sum of its parts. The "more than" is the relation between the parts or the pattern which they form. Thus four dots in a row and four dots in the form of a square (Figure 46) are both groups of four dots, but in each case there is something more than the four dots, namely, the pattern of their arrangement. The four dots at (*a*) do not "equal" the

Figure 46. The Whole as Sum and Pattern

four dots at (*b*). Similarly, a desk is more than the wood, screws, and varnish of which it is made, and an automobile is more than the materials from which it is fabricated.

The second principle is the *law of derived properties* and may be stated as follows: A part derives its character from the whole of which it is a part. Thus in Figure 46 (*a*) each dot is a part of a line; whereas in (*b*) each is a part of a square. Similarly, a piece of wood may be a part of a desk, or of a sail boat. In other words, the relationships between things are in many cases more significant than is ordinarily supposed, for it is the relationships which determine form and use.

Perceiving Visual Forms. Dots and lines may thus suggest or become patterns. When a line forms a closed or nearly closed figure it seems to become the boundary of a surface. Thus the three lines in Figure 47 (*a*) simply make one irregular line. Three lines of the same length when arranged as in (*b*) suggest a completed triangular surface like (*c*). The observer completes the figure by extending the lines at the apex as indicated by the dots. Supposedly the observer might complete the figure as in (*d*), or in any one of a number of ways, as for example by putting a circle or a square on top of the uncompleted triangle.

[1] See R. H. Wheeler and F. T. Perkins, *Principles of Mental Development,* New York: Crowell, 1932.

Instead, the tendency is to follow the two principles of *simplicity* and *continuation*. The closing-in of the figure is usually done perceptually in the simplest way, if possible by continuing the lines already drawn.
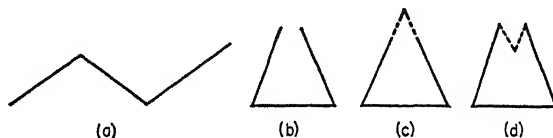
Figure 47. Closure

In rounding out uncompleted figures (see Figure 48), apparently two factors are operating. One is that of *closure*, as just described, according to which a simple pattern is completed by continuing lines already drawn, a process which supposedly is independent of experience with circles, polygons, and the like. The other factor, in which missing parts are supplied to familiar patterns, is definitely experiential. The process of thus completing patterns and making them into perceptual wholes is annoying, useful, or enjoyable in such varied activities as

Figure 48. Completing Figures

proof reading, supplying the missing parts in intelligence tests (the boy's mouth in Figure 48), completion tests, cartoons in which few lines suggest a face (the portly gentleman in Figure 48), and seeing pictures in ink-blots or clouds.

The process makes for more rapid reading, since one finds it necessary to look only at parts of letters and words. How effectively one may supply the missing parts may be illustrated by holding a sheet of paper along the lower half of a line of print. To see and read the letters it is necessary to see only the top half. How easy it is to see what isn't there is further illustrated by those drawings which appear from time to time with a statement underneath to the effect that there are fifteen things wrong with this picture. One may not notice at first that the numbers on the clock are backwards, the spout on the teakettle

is wrong side up, the light comes from a part of the wall where there is no window, and so on.

Another principle, besides that of closure, which is operating in the perception of visual forms, is that of *equality*, or the unison of like parts: Like parts unite to form a pattern. This may be illustrated by

(a)   (b)
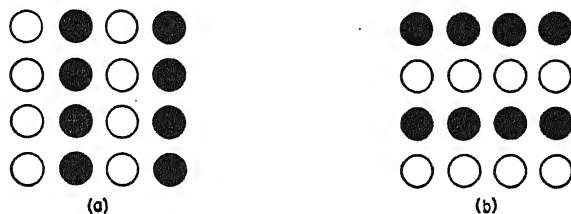
Figure 49.   Unison of Like Parts

the small circle diagrams of Figure 49. In (*a*) the lines are vertical, in (*b*) horizontal, whether the figure is drawn with shaded parts, different colors, or differently shaped small figures. Similarly, symmetrical patterns, those which are alike on both sides, are more apt to be noted than similar but irregular shapes.

A third principle of form perception is *proximity:* Adjacent parts form wholes more readily than more distant parts and tend to unite

Figure 50.   Proximity

into a pattern. For example, in Figure 50 the parallel lines that are closer together are seen as pairs. It is quite difficult to see the more widely separated lines as pairs unless, as in Figure 51, the influence of proximity is overcome by that of closure, the tendency to round out figures.
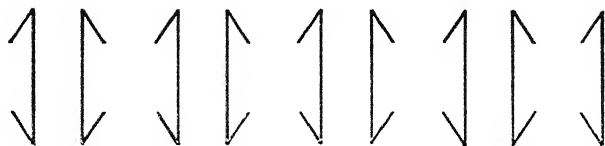
Figure 51.   Proximity vs. Closure   (From Kurt Koffka, *Principles of Gestalt Psychology*, New York: Harcourt, 1935, p. 168. By permission.)

Figure and Ground. When a figure or pattern is perceived, it seems to lie upon the background; its parts stand out more clearly and impressively than the ground, which is more uniform and undifferentiated. This is true of human figures painted against a landscape. Similarly, a complex structure may remain the same but will form varied patterns.
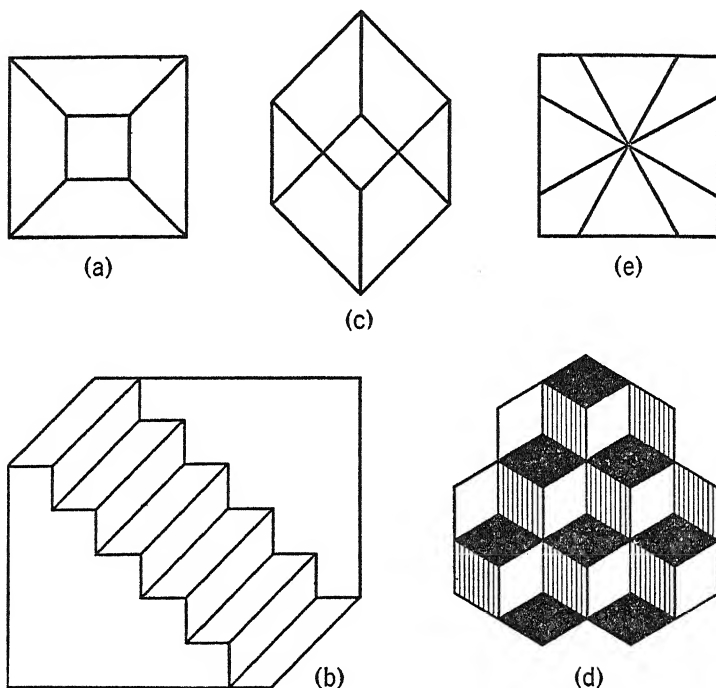
Figure 52. *Ambiguous Figures* (*a*) Is the inside square nearer to you than the outer? (*b*) The reversible staircase. At first this looks like an ordinary flight of stairs. By focusing on the upper jagged line (and pulling it toward you), the staircase turns over and looks like cellar stairs seen from underneath. (*c*) The reversible cube. Is the lower midpoint nearer? (*d*) The illusory cubes. How many cubes do you see—6 or 7? (From Jastrow.) (*e*) The Maltese Cross.

For example, a person entering a schoolroom where the pupils are taking an examination may see the activity of the pupils, or the insufficient lighting, or the patterns of color of the pupils' hair and clothing, or the architecture or furniture of the school building. Different visual patterns in the same structure can be illustrated diagrammatically very simply. An arrangement of five dots in the form of a square with one dot in the center can be perceived as such, or as two diagonals, a cross,

pairs of large right triangles, or as four smaller right triangles, and doubtless in other ways. Such patterns sometimes employ the third dimension as in the reversible perspective of ambiguous figures (see Figure 52). In the case of (*e*), the Maltese Cross, the corners of the square become "ground," and scarcely noticeable when the cross is seen; but when the cones pointing to the center are seen as the figure, the sides of the square drop into the background.

One characteristic of the perception of such visual forms is *discontinuity*. One pattern is perceived or abstracted, then there is a kind of jump to another. It is very difficult if not impossible to see both at once (unless they become parts of a pattern which includes both). The transition from one pattern to another almost seems to produce movement in the figure itself. Sometimes the new pattern does not appear to the observer at all. Such a condition is fairly frequent in school learning, particularly in classes in geometry, where the complex figure drawn on the board is seen by the pupil, but not the two right triangles, perhaps, which are a part of it. Almost any figure will baffle classes in plane geometry if it is distorted or drawn the other side up unless the teacher gives the pupils experience in perceiving the significant parts regardless of the position of the total figure.

Structuring Space. The process of visual perception is, as one might say, a process of drawing lines, actually or figuratively, to enclose a part of the field. The figure thus enclosed and set off from the background is the form or object perceived. Learning to perceive is learning where the lines are or should be drawn to make the needed patterns to which response is to be made. Thus each individual must, in a real sense, create the structure of the world about him. A geometrical demonstration often requires that lines be drawn which do not appear in the original figure, so that the pupil must actually do his own structuring, often before the relationships of the parts of the figure can be fully comprehended. Similarly, in place geography, the relative directions and distances must be interpreted from maps, a process which is complicated by the different "projections" that are commonly used, in which the lines of longitude are parallel straight lines thus enlarging the areas closer to the poles, or in which the lines of latitude or longitude or both are curved.

Mechanical and architectural drawing require that the reproduction of the perceptual pattern be restricted to the object itself in its correct dimensions, while all other detail is eliminated. In the graphic arts, the pattern includes variations of perspective (for example, see the house

in Figure 53), color contrasts, reflections, light, and shade, so that the perception of the artist may be rightly reproduced. Certain principles of esthetics, to be discussed later, assist the artist in achieving the desired effects.

Three-dimensional constructs are similar but for their greater complexity. Their two-dimensional representation diagrammatically and pictorially is more complicated, and more difficult for the beginner. They may, of course, be represented in three dimensions mechanically by the use of models, or actual constructions of the designs may be undertaken. In the field of the arts, sculpturing—whether it is clay
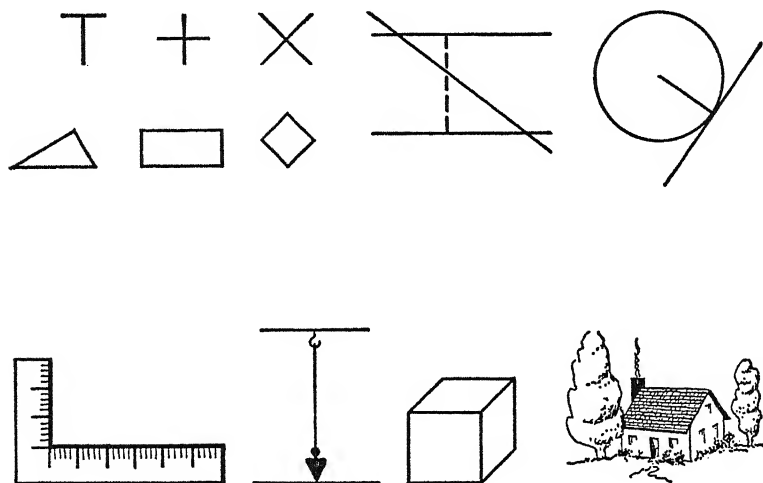
Figure 53. Varying Concomitants in the Perception of the Right Angle

modeling or work in bronze or marble, in relief or in the round—is likewise a process of structuring space, or seeing something that in reality isn't there until it is constructed or created. Likewise, architecture—whether it is making paper models of houses, or building a house of blocks or orange crates, or a permanent structure of wood and stone —involves the same process. Experience in structuring space, whether the standards are those of the artist or the engineer, is properly provided at the level of development of the pupil. For it is important that children acquire a knowledge of the relationships of different parts of space to each other. The use of quantitative description and numerical symbols grows naturally out of such perceptual experience.

Perceiving the Significant. When the construct is already in existence, whether it is a drawing, a map, a picture, a machine, a statue, or a house, whether it is a word, or a scene in daily life, how is one to tell what is the part that should be perceived? What is the part that *should* stand out from the rest as a figure upon a ground, and to which response is to be made? The part that *does* stand out may be unimportant even if it is noisy or large or bright or intermittent or has some other sensory prepotency, or even if it forms a good, well-rounded figure. And, for the moment leaving the acquisition of the proper response out of consideration, how can pupils be taught to see what is thus significant? This is an important question educationally, and the answer is relatively simple though its incorporation in teaching method is most difficult. It may be done (1) by the *repetition* of the whole that contains the significant part, and (2) by *emphasis* on the significant part. The emphasis can be provided with a pointer of some kind or a diagram or both. The *diagram* is a simplified representation from which unnecessary details are excluded, so that attention may be concentrated on the significant parts. It is more necessary in complicated spatial relationships, as, for example, in physics, physiology, geography, and the like. A geometrical figure or a map is such a diagram. To aid in emphasis the important lines or parts may be drawn in heavier crayon, traced with the pointer, or underlined, as in the case of the correct letter in the spelling of a difficult word, or of word roots or endings. Repetition will employ the method of *varying concomitants*. This is the process of presenting the significant element repeatedly, but in different "wholes," that is, in different contexts and relationships.

The principle of varying concomitants may be illustrated in various ways. For example, to enable pupils more readily to see a right angle it may be presented in different positions and relationships (Figure 53). Good method would allow suggestions of variations from the pupils in addition to those presented by the teacher, but actual as well as abstracted forms should appear, such as the carpenter's square and plumb line, and three-dimensional relationships as in a cube and a house. Other geometric relationships, the triangle, perpendicular, vertical, horizontal, and the like, can be presented repeatedly with varying concomitants. Parts of words may similarly be emphasized, the word *horizontal* being a case in point, with the horizon part underlined. Teachers of any "subject" can use this method in emphasizing the important parts of new words, particularly those of a technical nature. The word "social" may be taken as an example with its derivation from the Latin, *socius*, meaning ally or companion. Concomitant variations may be

found in many English words such as society, association, sociable, socialize, socialism, and sociology.

Obviously, the same stimulus situation will have more than one significant part that pupils must learn to see, depending on the purpose of the activity in which they are engaged. Thus, in a geometric figure, it may be the right triangles, or it may be the relation of the radius to the circumference. If pupils are to add such numbers as 2.3, 55, 6.31, the decimal point is of first importance and the size of the digits to be added can be attended to next. In the case of such words as socialize and socialism, the endings may need more emphasis than the roots.

If one is making a purchase, the use to which it is to be put, whether its function is utilitarian or artistic, whether for oneself or some one else, will lead one variously to note the price, the size, the weight, the name of the maker, the workmanship, or the general appearance. The situation is that described earlier in connection with the ambiguous figures. No one part will be perceived at the same time as another. Discontinuity prevails here as elsewhere. But, for the usual purposes, instruction will single out the significant, whether it be a matter of geometric demonstration, correct linguistic or social usage, economy, esthetic satisfaction, or some other. Thus pupils learn to "see" what is before their eyes. But what they thus learn to see is something they could not see before. They learn to see parts, patterns, and configurations that have significance in one way or another. They learn to structure the space that is about them, to parts of which they can then adjust, and with which they can gradually learn to live.

Distinguishing the Similar. The experimentation in the discrimination of small differences between sensory stimuli, particularly in weight and intensity, has already been mentioned. More significant educationally is the discrimination of similar perceptual patterns. Objects and symbols may resemble each other in many details and yet be different in very important respects. In such cases the significant part may be the seemingly minor part. A cat and a skunk are somewhat alike, yet there are important differences. The same is true of many harmless and poisonous herbs, and of good and cheap purchasable articles, since much that is produced seems to be planned to make it look like something better. It is easy for the buyer to be deceived. The difference between a right triangle and one that is not a right triangle may not be easy to see, or that between 2.5 and 25; though the difference between $2.50 and $25.00 is fairly obvious. The difference between 4:12 and 4:21 in a time table may not be noticed but the misreading may cause an individual

to miss his train. Similarly the differences between p and q or b and d are slight, but such confusion is sometimes the cause of reading difficulties and failures. Some of the differences which teachers insist on often seem unimportant to their pupils, and perhaps some of them are. If they really are important, the teacher's task is to emphasize their importance. The shop teacher has an advantage, for, if a part of an object a child is constructing is the wrong size, it doesn't fit. The child can see it for himself; the teacher rarely has to point it out. But *vocavit* and *vocabit*, to the beginner in Latin, may seem hardly worth differentiating, though it would make a difference if the reference were to a telephone message reported to him. *Ringen* and *Rang* may look enough alike to the beginning German student to refer to a bell, and *la mer* and *la mère* to the pupil in a beginning French class may look like two forms of the same word. But by repetition and by pointing to the significant element the teacher can magnify seemingly small differences until they attain a magnitude commensurate with their importance.

4. Temporal and Space-Time Patterns

Rhythm and Melody. Thus far, reference has been made almost entirely to patterns that may be seen, to those that it might be possible
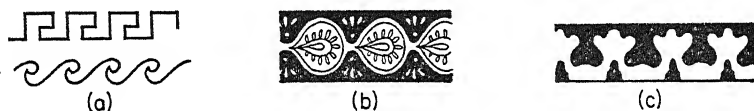
Figure 54. Rhythm in Design (Kurt Koffka, *op. cit.*, p. 186.)

to photograph. Auditory patterns, however, are temporal and not spatial. The bass drum beats out a familiar rhythm for marching that can be indicated thus: - - - - - -/- - - - - -. The accented parts in a march and in a waltz recur at different intervals, though many children are slow in learning to distinguish them. Complicated rhythmic patterns can be tapped out with a pencil, or observed in nature, as, for example, the rhythm of the hoof beats of a galloping horse. Rhythm is the regular recurrence of like features. The term may be used figuratively to apply to the repetition of visual patterns and designs, as in Figure 54. The design may be simple as in (*a*), or more complex as in (*b*), where each recurring pattern itself is made up in part of rhythmic design, or like (*c*), where there is an ambiguity of figure and ground.

The recurring temporal patterns correspond to the figure in visual space. The rhymthic melody constituting a musical phrase or theme

may be repeated in a composition, now in one key now in another, in different registers, and by different instruments. But the relationships of time and pitch between the notes remain the same, as does the position of the lines forming a right angle, no matter where it may be found.

Identification of Temporal Patterns. Temporal patterns have reached their most detailed development in music. They are matters of interest and importance in other fields as well, as, for example, in such physiological rhythms as breathing and the heart beat, in the developing crisis of a disease, in sleeping and waking, and in the calls or notes of birds and other wild creatures. In the late summer it is sometimes possible to distinguish three simultaneous patterns of sound in the noises of the crickets, frogs, and katydids. In the rhythmic cadences of speech one may detect individual and local peculiarities quite as much as by the actual sounds produced, and it is in these temporal patterns that the foreigner is most likely to continue his earlier speech habits after his pronunciation is otherwise quite correct.

Pupils may be aided in identifying temporal patterns in the same way as spatial patterns, by repetition and emphasis. The conductor's baton may be the pointer, and the "time" or the rhythm may be made prepotent by exaggeratedly "beating time" and by vigorously tapping out the temporal pattern to be perceived.

Movement. Most temporal patterns that are of importance in education, however, have a spatial counterpart. A person changes his position in space during a period of time. This is clearly illustrated in learning a dance step, when, following a certain rhythm, such and such movements are to be made. A snapshot is inadequate in representing such a pattern; an animated diagram or a motion picture is necessary. The same is true of space-time patterns in sport. A golf or tennis stroke involves movements of the body through time. The background of such movement is the "swing," or "follow-through," while the separate positions and movements of the fingers, hands, shoulders, and knees can be perceived in part visually and in part kinesthetically as figures taking place against the background of movement. A football play involves movements of several persons through time. A spectator may observe the action of one figure (player) against the ground or pattern of the total play. Complicated diagrams are drawn by coaches on the blackboard to illustrate where each player is supposed to go if the play is to be completed.

When space-time patterns are involved, an enlargement of the law

of derived properties becomes necessary, called the *law of determined action:* The whole determines the activities of the parts. To employ the illustrations already used, the movements of the hands or other body parts in a golf stroke are determined by, or grow out of, the whole stroke, and the action of each man in a football play is determined by the whole pattern of the play.

Timing. In acquiring space-time patterns of movement, what is called timing is of supreme importance. The sequence of moves must be such that the parts of the pattern make contact or fit together. This is obvious in any game in which a ball must be hit or caught or thrown. In baseball, the batter may have ever so good a swing, but there are no cheers if the swing is a little too soon or too late. The basketball player must start for the ball before it gets to the place where he will catch it, and must throw it not where the one to receive it is, but where he is going to be. Timing is similarly important in the use of power tools, lathes, ironers, and automobiles.

Just as the nature of a spatial pattern or design may be determined either by utilitarian or esthetic considerations, so a space-time pattern may be regulated either for practical or artistic reasons. The playing of a musical instrument demands that the fingers be placed in certain positions at certain times. Timing is of the essence in good dramatic production; the character who moves or speaks too slowly or too rapidly, or who waits too long or not long enough after his cue, ruins the part.

Process. A space-time pattern of longer duration is frequently spoken of as a process or a procedure. Thus the manufacture of an article involves the moving-about and changing of the parts of which it is composed, all to the end that the article may be completed. The steps that must be taken to bring suit, enter a college, become a citizen, or get a job are cases in point. The developmental or life history of a child and the rise and fall of an empire are also space-time patterns, though in these cases less control can be exerted over the modifications than in a manufacturing process. Viewed in this way, the present is a cross-section of a very complicated space-time pattern. The study of history permits an individual to place himself imaginatively at one or another such cross-section and follow along through time as the patterns are rounded out.

The Operation of Gestalt Laws. The law of field properties is operative in temporal and in space-time patterns just as it is in the case of purely spatial perception. The melody, for example, is "more" than

the notes of which it is composed. The air of the old hymn, "Jesus Lover of My Soul," has 6 F's, 12 G's, 18 A's, 3 B♭'s, 13 C's, and 4 D's; but such systematic arrangement has little appeal. The words of a story are all in the dictionary, and the verb forms are all in their paradigms in the grammar. In all such cases, the pattern or arrangement of the several items is "more" than the items themselves. In fact, it is what makes the separate items of any interest or value.

The law of derived properties, with its correlate, the law of determined action, as we have seen, is likewise operative in temporal and space-time patterns. A note or a word depends for its peculiar significance on the *context* in which it is found, the whole phrase or selection of which it is a part. Particularly true is this of such words as "yes" or "no." Certain kinds of conduct may be appropriate at a ball game but not in a library. A general symptom such as a headache or melancholy may, in relation with others in the syndrome, be indicative of indigestion or sunstroke, or of manic-depressive insanity or catatonic schizophrenia. We hesitate to judge the particular act of a child, such, for example, as his hitting a playmate with a toy, until, as we say, we get the whole picture—that is, until we know what preceded the overt act and what the child was trying to do.

The principle of closure seems to operate in temporal patterns too—for example, in the completion of a rhythmic or melodic line or in the compulsion one feels to complete an unresolved chord. In space-time patterns, the uncompleted play in football implies a similar rounding-out. In such cases the position of any one player at any one time is determined not only by the past—where he came from—but also by the future—where he is going in order to complete the play and so round out the space-time pattern. Of course, it is not the *real* future, for the pass may be intercepted and the play remain forever uncompleted. It is a *perceived* future, that corresponds to the perceived missing parts (Figure 49), which really aren't there. The *uncompleted task*, it has been found, tends to be remembered better, other things being equal, and its completion is apt to be strongly motivated. Thus a dynamic activity is operating to finish off the space-time pattern similar to that which is found around the uncompleted part of the spatial figures previously discussed.

Identifying the Significant Space-Time Patterns. Significant spatial patterns can be repeated and emphasized in various ways while the learner is seated and attending to the one part or aspect of the situation being discussed. Not so the space-time patterns. And this fact

presents many difficulties in instruction. The learner must observe a process; and the particular part that is significant may occur so rapidly that it is over and gone before it can be pointed out. This is true of many kinds of activities—football plays, figure skating, fancy diving, dramatics, public speaking, lathe work, and so on. The difficulty is great enough when someone else is being observed; it is greatly increased when the learner is at the same time the performer and is thus a part of the pattern which he is supposed to observe. Various techniques are employed by teachers and coaches which are variations of the principles of repetition and emphasis already enunciated. "Look what you are doing," "Check up on your feet," and similar directions are given at points where a pause is possible. The teacher or coach will often go through the motions, exaggerating the mistake made by the learner and then exaggerating the correct way. Motion pictures and sound films show the learner what he is actually doing and saying and so enable him to modify his performance accordingly.

Similar temporal patterns are sometimes difficult to distinguish, as the recruit discovered who stood up when he heard the band play "Columbia, the Gem of the Ocean," thinking it was the "Star Spangled Banner." More elusive are the differences in the notes of some birds— for example, between those of a pewee and a phoebe. Whenever a signal is heard that calls for a particular kind of action, it is important not to confuse it with some other sound, no matter how alike they may be. This holds no more for the calls of wild creatures than it does for the clicks of the Morse code, the directions of an employer, or the laughs, snorts, or groans, as well as the verbal inflections, of one's friends and acquaintances. Sometimes people are misunderstood because what they say is not interpreted in relation to what has occurred or to the particular emphasis or inflection given their requests or orders. Teachers occasionally have disciplinary troubles because at one time they may be "fooling" and later, when they are not, the pupils think they are. The misunderstanding is revealed when a hapless child who has been reprimanded exclaims, "Yes, I heard you tell us to stop, but I didn't think you really meant it." It is necessary to view what is said as a part of a larger pattern. A mistaken interpretation then is like an illusion produced by the ambiguous figures. The pattern of the easy-going teacher emerges, but the pattern of the teacher who has decided to "tighten up" is the one which on this occasion should be perceived.

In this illustration, spatial factors are operative, as they are quite likely to be in a temporal figure. Facial changes and gestures supplement the words of the coach at third base so that the man on second

doesn't have to get his cue from the location of the ball alone. The difference in the total situation which would determine whether or not he should run to third base may be so slight that, being a part of the play as he is, he may be unable to see it; so the coach is there to tell him. In a game like chess, the action is slowed down, allowing more time to perceive the total configuration and to act accordingly. Even here, however, less skillful players are heard to exclaim: "Oh, I didn't see your queen."

In order to clarify the discussion, the point may be stated in this way: Suppose a learner knows what to do and how to do it when a certain situation presents itself. It is important that he be able to identify the situation, whether it is spatial, temporal, or both, and whether it is simple or complex. The *identification of the situation* is the perception of a kind of pattern or figure which emerges or stands out from the background of things and events. If he doesn't perceive any pattern, or if the one he perceives is the "wrong" one, his response will be at least inappropriate, and it may be "wrong," even though it is made by a pupil who could make the correct response if he had perceived the situation aright.

5. Perceptual Aids in Learning

Visual Aids. Various kinds of visual materials are available for school use that provide opportunities for repeated observation and emphasis of many of the complex patterns of the objective world. In fact, "visual education" has almost taken on the characteristics of a movement, so enthusiastic are some of its devotees. While its values are recognized by all, there is one caution which should operate against the advocacy of its too-exclusive use. Visual materials tend to promote less active learning, that is, learning in which the pupil just sits and looks, thus being a "receptacle" of instruction, a condition against which progressive educators animated by the "learning by doing" motto have long inveighed. The caution should not lead teachers to reduce the amount of visual material; on the contrary, in most schools there should be more of it, for the perceptual clarification and the emotional empathic factors are of great value. In addition, pupils should not only look at the pictures, but should actively identify and discriminate and even participate, they themselves furnishing or constructing pictures, slides, models, and the like.

The simplest and most nearly universal of the visual aids is the blackboard. While it is often not employed as skillfully as it might be, it does provide a means of pointing out specifically just what is impor-

tant at the moment, either verbally or diagrammatically. Supplementing the blackboard are all kinds of charts, maps, bulletin boards, pictures, transparencies, film strips, slides, models, museum exhibits, specimens, apparatus, trips, and tours. Less flexible than the blackboard in their use, choice may be made from these materials and procedures to clarify specific points where verbal instruction alone is insufficient. But here, as elsewhere, the pointer in the hands of the teacher or pupil is far more important than is generally realized. The mere presentation of the visual material does not insure that the pupil "sees" the particular pattern, be it mathematical, esthetic, geographical, or other, the clarification of which is intended.

The development of instructional motion picture films has proceeded at a rapid rate in recent years, more and more films are available, and more and more schools in one way or another have provided themselves with projectors. The case, and not a very strong one, against the use of films may be summed up thus: (1) They encourage a "passive" attitude. This point has already been discussed. (2) Not enough good films are available. The answer to this objection is that many are, and more are being made. (3) Their projection presents technical difficulties with which teachers have not been trained to cope. Teacher preparation too often does not include experience in the selection of adequate films, their cataloguing, and projection, to say nothing of their most effective classroom use, while there is rarely any one on the staff who knows the processes of producing a film—preparing the script, photographing, and editing—well enough to guide a pupil film project. Such preparation should no longer be left to the uncertain chances of in-service training. (4) They are costly, requiring adequate storage and upkeep. This objection suggests the need for intelligent selection of materials and provision in the school budget for their purchase. Pupils themselves may often furnish the motivation for added purchases. (5) Slides, transparencies, and film strips do not have these disadvantages and should therefore take the place of motion pictures.

So far as the last objection is concerned, it is undoubtedly true that a large fraction, sometimes as much as a half, of the silent motion picture film is taken up with titles and with subjects at rest. Actually, much that is of interest and value can be presented in stills, and can be presented less expensively, especially when color is desired. However, besides the fact that the movement of the picture as a whole may make for greater interest and heightened attention, the essential value of the motion lies in the fact that it can be used to picture space-time patterns. Where movement in space through time

is the significant thing, only the motion picture is adequate. To the patterns which have previously been discussed, involving human activities such as athletics, public speaking, and the like, can be added such patterns as the operation of a machine, the activities of wild animals, and demonstrations difficult or impossible to repeat in the ordinary laboratory, such as cell division, the effect of radium on cancerous tissue, and the development of the chick embryo. Besides these, there are the films which demonstrate a process of manufacture, a course of training, or a way of life, as well as the documentary films in which the development of an idea is traced through its varied visual ramifications. For many subjects the use of slow motion is of great value, revealing as it does what takes place too rapidly to be observed otherwise.

Auditory Aids. The chief auditory aids in instruction, supplementing the voice of the teacher, are the sound track, the phonograph, and the radio. Sound motion pictures are being produced for instructional purposes in increasing numbers and serve not only to give greater interest, vividness, and entertainment value to the film, but also to point out and emphasize its significant features. Except in technical films which deal with materials in which the teacher would not necessarily be expected to be informed, the value of the sound track is somewhat dubious, since the sounds are usually either incidental music, or "sound effects," or an accompanying "voice" or lecture. For the latter, a manuscript may be quite as effective, providing the teacher takes the time to run through the film and lecture notes before presenting them.

Phonograph recordings are valuable when used in conjunction with films, or separately. Like the film, they permit a repetition and emphasis of the significant. Separately, they have been used most frequently in courses in music appreciation, where, unfortunately, the selections chosen and the formal methods employed in presenting them have too often negated their potential value. Famous passages spoken by great actors, foreign language pronunciation, and recordings of the speech of those who need training in speech correction represent other pedagogical uses to which these records of auditory temporal patterns have been put. Wire and tape recorders likewise have their special uses.

By and large, it is probably true that the radio is still a toy in the school, and no one really knows how to use it effectively, or even whether it can be so used in instruction. Some professional radio programs, if the time schedule permits, have considerable significance for school pupils, as do broadcasts of events of social, political, or artistic significance. In television there are almost unlimited potentialities.

A public address system within the school is of occasional value in bringing a speaker's voice to the ears of a large audience. It has been introduced by principals who like the idea of speaking directly, though in absentia, to the teachers and pupils in some or all of the rooms in the school building. It is essentially an extension of the human voice and not, like the film or phonograph disk, a record that makes repetition and study possible. However, the play-back of recorded radio events, whether they are derived from commercial stations or school programs, makes them available at appropriate times.

Kinesthetic Aids. While there is no need to deprecate the importance of visual and auditory aids in instruction, since they assist in helping the pupil to perceive and understand the structure of his world, yet by themselves they are incomplete. At the worst, the pupil passively observes; at the best, he perceives relationships, understands, and participates mentally. The visual and auditory aids are of the same order as the reading, talking, and demonstrating done by the teacher before stereopticons and motion picture machines were invented. Good instruction must go farther. It must include emphasis on significant parts— that is, pointing—as previously stated; and it must include participation —that is, doing—on the part of the learner.

The most perfect sound motion pictures in color of the various strokes in swimming will not teach a child to swim. They may help; but, if he is going to learn, he must "go through the motions." One can learn to do something only by doing it, whether it be learning to participate in a sport, to play a musical instrument, to make a speech, translate a sentence, demonstrate a proposition in geometry, solve a problem in physics, or run a student council. The point of view of the learner changes when he is participating. He is no longer looking *at* what is going on. He is *within* the structure; he is a part of the pattern that is evolving. He may see and hear himself, but he must also kinesthetically feel himself in the "part." The part is an activity figure that is set off from, or individuated out of, the ground of the rest of the action. A similar emergence of a partial activity pattern out of the total motor coordination was mentioned earlier as the basis of Coghill's theory of the development of the reflexes, derived from his experiments on the fetal salamander.

One may attend successively to several such part movements, but in learning a golf stroke each is only a part of the whole swing. Following the law of determined action, it is the whole movement which determines the activity of its parts. Actually, it cannot be performed (though

it may be approximated) apart from the swing, for the reason that it grows out of the total activity. This is the principle of *individuation*, which is stated as follows: Parts of wholes come into existence through an emergence process called individuation, or structurization, or differentiation. Therefore, to make the part movement one must make the whole movement. Or, to put it in more familiar language, to make the complete stroke one must "get the feel of it," parts and whole together.

Opportunities for learning by doing have come into the school gradually from different directions—from athletics, music, vocational or shop work, the kindergarten, and the progressive education movement. A tendency has developed to overemphasize its importance, as "visual education" and other good educational ideas are sometimes overemphasized, in the so-called "activity program." When pushed to excess, this movement has led teachers to try to invent activities in which pupils are supposed to learn what they could have learned more easily and just as effectively by looking or reading. In most schools, however, more opportunities are needed for learning by doing, that is, for perceiving space-time patterns kinesthetically from within. The various mental and muscular coordinations and adjustments which are made to the patterns that are perceived can then be modified and improved through a further process of learning.

6. Conceptual Patterns

Words as Symbols. A person may have an idea of a sort without being able to express it adequately and precisely in words. And he will know what another person is thinking only on the basis of the words used, perhaps supplemented by gestures. Thoughts cannot be perceived directly, and pointed to, the way objects can.[2] Instead, they have to be represented symbolically by the use of language. For example, in a cafeteria, a customer may point to the dish he desires. It constitutes a visual pattern that is easily distinguished from the other dishes on display, and from the people around, the various aromas of cooked food, and the sounds of rattling dishes. However, if he is presented with a menu, he doesn't see the food at all, except perhaps by surreptitious glances at the plates of near-by diners. He looks at words, about which there is considerable agreement as to what they signify, and makes his choice accordingly. Or, if the waiter recites the menu, the diner must respond to aural instead of visual symbols.

[2] See Edna Heidbreder, "Toward a Dynamic Psychology of Cognition," *Psychological Review*, vol. 52 (January, 1945), 1–22; and "The Attainment of Concepts—a Psychological Interpretation," *Transactions of the New York Academy of Sciences*, vol. 7 (May, 1945), 171–188.

We are so accustomed to this process that we take it for granted and assume that other people know what we are talking about. Waiters are not always indulgent toward diners who ask what they are likely to get if they order some of the items on the menu. Nor are customers in a foreign country apt to be sympathetic toward waiters or other residents who persist in not understanding what is wanted, even when they are shouted at! The words are not the things, but are only signs agreed upon to represent them. Obviously, if we do not know what the signs mean, we are unable to discern the conceptual pattern that is addressed to us, or that we see in print.

This obvious fact has come into prominence in recent years in connection with the preparation of textbooks. Word counts have shown that the *vocabulary load* of various school subjects has been all out of proportion to the abilities of children to master it. There were too many words, and the pupils could not be expected to know what they all meant.

Language and Meaning. Since words have no meaning in themselves, except possibly a few like "bow-wow" and "ding-dong," the meaning has to be acquired. As Thorndike has put it,

Meanings are in persons' minds, not in words, and when we say that a word has or possesses such and such meanings, we are really saying that it has evoked, or caused, those meanings. Until it gets into a mind, a word is only puffs of wind or streaks of ink. What a word, sentence or other expression means to a hearer or reader is mainly what it makes him think or feel or do as a fairly direct consequence of hearing or seeing it, and, more narrowly, what it makes him think, or think of, as the direct and almost immediate consequence of hearing or seeing it.[3]

Since so much instruction, as well as so much in human interrelationships, depends on words, it is important to understand just what is implied by the term "meaning," and how meanings are acquired, as well as some of the confusions that arise from their misuse.

There are three relationships of words which give them meaning.[4] These are shown in the diagram, Figure 55. We can at once see from

[3] E. L. Thorndike. "The Psychology of Semantics," *American Journal of Psychology*, vol. 59 (October, 1946), p. 613.

[4] This section follows closely Chapter XI, "Language and Meaning," by Ernest Horn in the *Forty-first Yearbook of the Society for the Scientific Study of Education, The Psychology of Learning*, Bloomington: Public School Publishing Co., 1942. The three dimensions of meaning are derived from Charles W. Morris, references cited by Horn.

this diagram that it is not enough merely to look up a word in a dictionary to find out what it means, though this is a help. The relationships, how the words are used, and by whom and to whom they are spoken make a great deal of difference. While these relationships tend to merge into each other, it will be profitable to consider each one separately.
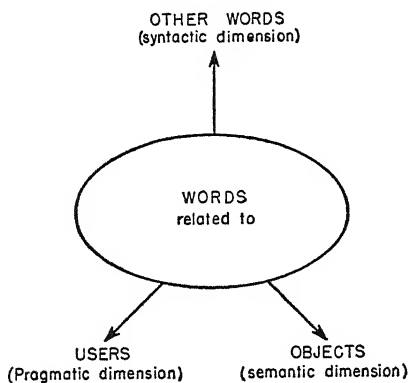
Figure 55. The Three Dimensions of Meaning

7. Dimensions of Meaning

The Syntactic Dimension. Words have meaning, in the first place, according to their relation to each other in the sentence or paragraph. This is the syntactic dimension, which has been explored by the linguists and logicians, and is obviously important to understand. Parts of speech, such as nouns, verbs, prepositions, and pronouns; grammatical designations such as subject, object, modifier; characteristics such as case, number, and gender, as indicated by word order and inflections, all contribute to our understanding of meaning. Such grammatical errors as wrong word forms, pronouns without antecedents, dangling participles, and the like may only indicate a class deviation from the accepted dialect (e.g., "Who done it?" or "We was all there"), or they may produce misunderstanding and confusion (e.g., "Standing on the street corner, a stranger drove up and called him by his first name which you are not supposed to do"). Similarly, logical relationships may be correctly or incorrectly indicated by such words or phrases as although, on account of, since, and when.

It is therefore clear that meanings depend not alone on the words themselves, but also on the connections between them, on the system or pattern or relationships in which they are imbedded. This pattern is referred to as the *context*—etymologically, the words which are "bound together." For example, "refuse," means one thing in the sentence, "I refuse," but quite another on the sign, "Dump refuse here"; and a sewer is one thing to a city engineer and another to the member of a sewing society.

Passages quoted out of context are often quite unfair to the speaker or writer. A dramatic critic who hadn't learned better might write,

"If you want to be bored, don't miss this play." An advertisement of the play then might quote him correctly as saying: "Don't miss this play."

The Semantic Dimension. Words have meaning, in the second place, according to their relation to the objects they refer to, called the referents. This is the semantic dimension. The referents may be things, like house or tree, even in which relatively simple cases there may be confusion if the experience of the reader or hearer has been circumscribed or different from that of the writer or speaker. The importance of experience in comprehending meanings will be discussed shortly.

But the referents may be abstract qualities as well, such words as "red" or "number" or "justice." Some concepts are particularly difficult to understand because of the complexity of the construct, like "housing problem" or "capital wealth," or because experience with them is difficult to obtain, such as "absolute zero" or "$\sqrt{-1}$." The process of determining exactly what a term denotes is a process of selection from what may be called the conceptual field, in the same way that the process of perceiving is one of selection from the perceptual field. The difference is that in the latter case the "field" is presented to the senses. It is "out there" where it may be seen or heard and pointed to, whereas in the conceptual processes it has to be represented by verbal symbols. Only if the words chosen to represent it denote the same objects, terms, or constructs, only if the referents are clearly indicated, can people be sure they are talking about the same things.

The Pragmatic Dimension. Words have meaning, in the third place, according to their relation to those who use them. The use to which they are to be put, the person or persons for whom they are intended, determine what words are selected and how they are organized. The pragmatic dimension, then, is that aspect of meaning that relates to the purposes and consequences so far as the particular writer or speaker, or reader or hearer, is concerned. This dimension is closely related to the others. The difference lies in the specific effect of employing a term in a specific situation to designate a particular object or construct.

Some of the most striking examples are to be found in the clichés of advertising, oratory, or ritual, in which the objects signified are vague in themselves but are tied in with emotion, sentiment, or prejudice and are used in order to change attitudes or get action. "Shoulder-to-shoulder" is such a phrase, or "the spirit of the founding fathers." Real estate developments do not advertise lots on which to build houses, but "homes."

It is important that one understand the pragmatic dimension not only to avoid being deceived by high-sounding phrases, but also to produce desirable attitudes and action. It is also important if one is to be understood, and, more specifically, if instruction is to mean anything to those who are being instructed. To this end, certain human variables must be taken into account: experience, set, intelligence, and language facility.

As was implied earlier, a word has meaning for an individual according as he has had *experience* with the object which it signifies. For example, if one child says to another, "Let's play in the sand box," both children are in agreement because both have played in the same sand box. But if a boy says to his visiting cousin, "Let's go to the rink," and the visitor has never skated on a rink, he is uncertain about whether or not he wants to go. Or, if the auto mechanic says the trouble is with the tappets, he and other machinists know what is meant, but the car owner may not have the vaguest idea. Textbooks are full of hundreds of words that children are supposed to know, but they have had no experience with what they stand for.

One investigator asked a group of fifth-graders how big they thought the "huge furnaces" were that were used for making steel as referred to in their geography book.[5] Answers ranged from the size of a filing case or "a little higher than our furnace" to "about as tall as this building" and "large as New York."

Another asked school children to write out the pledge of allegiance to the flag, and at other times to tell him what the words of the pledge and of some of their songs meant.[6] While he is willing to admit the emotional value of ritual, some of his findings were a bit surprising. "I pledge a legion," wrote one pupil, revealing his lack of understanding; while another class, singing "America," clearly rendered one of the lines, "land where the pilgrims pried."

These are not bizarre examples, but could be duplicated by the thousands by anyone who set about collecting specimens. Obviously, the first step in instruction is to provide pupils with the experiences which are designated by the words they will use. As Thorndike has put it,

Experience in listening and reading is a less dependable means of extending or refining knowledge of the meaning of words than experience of words in direct connection with realities.[7]

[5] Grace M. Ryan, "The Adequacy with Which Fifth-Grade Children Comprehend Quantitative Terms in Their Geography Textbooks," Master's Thesis, University of Iowa, 1935.

[6] W. M. Lamers, "Land Where the Pilgrims Pried," *The Elementary English Review*, vol. 23 (November, 1946), 308–310.

[7] E. L. Thorndike, *op. cit.*, p. 618.

A second important factor in the effect of language on the individual is his *set*. What is he interested in? What is he in the process of doing? What is he thinking about? Whatever it is, what he hears or says is likely to be fitted into that pattern. The Herbartian psychology emphasized the importance of preparation as a step in learning, the preparation of the mind for the new idea. Contrariwise, if the pupil is not interested in what is going on, it is apt to be meaningless to him. It must somehow be fitted into the on-going pattern of what he is thinking and doing. Here we may recall what was said in earlier chapters concerning needs and their satisfactions. Rewards are conditions relevant to life purposes. If meanings help an individual toward his objectives, he will acquire them with far greater rapidity and enthusiasm than he would without such motivation.

The third factor, *intelligence,* need only be mentioned, for its importance in understanding meanings is obvious, though often neglected. The common practice of failing or otherwise humiliating children whose intelligence is low, or who are slow-growing, or immature, because they cannot obtain good scores on verbal tests needs looking into. And particular care needs to be taken that instruction is adapted to the abilities of children if any desirable results are to be expected.

Closely related to intelligence and growth is *language facility.* It is reasonable to suppose that two children of equal intelligence might differ in this respect. One of the often-stated objectives of foreign-language study is to develop precision in the use of the mother tongue. While it may have this outcome, there is some doubt of its effectiveness, and it is certainly an indirect approach. The study of grammar from the syntactic angle was likewise expected to develop language facility. Unfortunately, both this and the foreign-language study became formalized and gradually lost ground. It may be that curricula and methods of the future, if aimed directly at the objective, will have a better chance of attaining it.

8. Selection and Emphasis

Paragraph Meaning. The following item appears among the classified advertisements in a daily newspaper:

For Rent. Apartment in a two-family house, four rooms, modern plumbing, good neighborhood, near shopping district. Call Smithton 372 after 5:00 P.M.

Mr. Jones is perusing the morning paper and his gaze chances to fall upon this notice. He is not very well satisfied with his present quarters,

and he has been keeping an eye out for a possible change of location. He thinks he will take a look at the apartment since the description is rather meager. "You can tell in a minute by looking at a place," he says, "whether it is anything you want or not." If he looked at it, there would be certain things that he would notice that for him would be prepotent. But he is not looking at it, only at words in a newspaper. He looks at the item again and "sees" that the apartment has only four rooms, which he thinks would be too small for his family. He looks yet again and "sees" that it is in Smithton, which he knows is some distance from where he works. For him, the size of the apartment and its location are prepotent, and he is saved a trip to Smithton to look the place over.

Such a situation is, of course, very common in the experience of everyone. Sometimes the reader "gets the point," that is, responds to the significant part of the situation that is described, and sometimes he does not. "Don't you see what that means?" we say, or "What is all the argument about?" or "I couldn't get head nor tail out of the whole thing." Jokes are so designed that the point is a little elusive, and may not appear as a figure on a ground, legal documents often seem to obscure the issue, and sales talks may play up some aspects of the product and play down others, such as the cost or the ingredients.

Just as pupils must learn to see the significant in a visual or auditory pattern, and identify the object or term signified by separate words, so they must learn to identify the main idea, the main point, in a larger verbal or symbolic pattern. But in this they are sometimes not too successful.

The following paragraph was presented to two hundred sixth-grade pupils with these directions: [8]

Read this, then write the answers to [questions] 1, 2, 3, 4, 5, 6 and 7. Read it again as often as you need to.

In Franklin, attendance upon school is required of every child between the ages of seven and fourteen on every day when school is in session unless the child is so ill as to be unable to go to school, or some person in his house is ill with a contagious disease, or the roads are impassable.

The first question was, "What is the general topic of the paragraph?"
What some of the sixth-graders wrote in answer to this question is summarized below:

[8] E. L. Thorndike, *Human Learning*, New York: Century, 1931, pp. 147 ff. By permission.

Franklin, days at Franklin, Franklin attending school, Frank-
    lin attends to his school, it was a great inventor, etc. . . 14.5 per cent
School, about school, to tell about school 12.0
If the child is ill, what the child should take, how old a
    child should be, if the child is sick or contagious disease,
    an excuse, etc. 10.5
The roads are impassable, the roads are impossible 1.5
A few sentences, made of complete sentences, subject and
    predicate, the sentence, a letter, a capital letter, to begin
    with a capital, etc. 15.0
The first word, a good topic, leave half an inch space, the
    heading, period, an inch and a half, the answer 7.0

It would be interesting, in such an experiment, to try to discover why some of the children responded as they did. True, the sentence is somewhat complicated in structure, yet deals with situations that supposedly were familiar to them. Some apparently got tricked by the "reversible perspective" in the directions, and gave what they remembered from their English class about starting a paragraph with the topic sentence. For some in the last group, the "top-" of "topic" was prepotent. For others, various parts of the total situation were responded to for one reason or another.

The ability to pull out or abstract from the total what is of prime importance may sometimes mean the difference between life and death, as in military orders or directions for taking medicine. Or failure may result merely in confusion or dissatisfaction. For the present, as in the case of perception, we are not concerned as to whether the individual can make the response the situation calls for, but only whether he can isolate the significant part of the situation to which response should be made. The ability to do this is measured by reading tests which direct the testee to answer questions on a series of paragraphs.

But in life situations, the data are not always to be found within the bounds of the paragraph. The structure of the situation may extend to events in the experience of the reader, and, in oral discourse, to the inflection and facial expression of the speaker. An interesting variation is found in the "double take" of the drama that is particularly effective in comedy. A part might run as follows:

The Sergeant: Such a good soldier as you have been, and strong as an ox you are too! You deserve a special job.

The Private: It's decent of you to say so, I always try to . . . Huh? What kind of a job!

Identifying the Significant Conceptual Pattern. Needless to say the learner should know what the teacher is talking about, and be able to discover what he is supposed to be reading about. Instruction and instructional materials should, of course, not be above his level of comprehension. But, even then, he will meet difficulties. So various techniques can be employed to help him in specific situations. As in visual or auditory perception, these may be classified under repetition and emphasis. In the experiment cited above, the subjects were told that they could reread the paragraph, though this doesn't seem to have helped them very much. The preacher is often quoted who explained his success by saying, "First I tell them what I'm going to tell them; then I tell them; and then I tell them what I told them." *Repetition* is needed not only as an aid to remembering, but as an aid to understanding in the first place. For one might well be expected to find out first what it is he is supposed to remember!

Emphasis is employed in various ways. Bold face type and italics are used in textbooks and headlines in newspapers. Gestures and variations of voice emphasize the point a speaker is trying to make, and teachers sometimes use such didacticisms as: "You will be held responsible for this" or "I am going to ask that on the examination." Much has been written pro and con on the subject of diagraming sentences, but one of its advantages is that it forces the learner to show that he knows who did what to whom! Similar advantages are claimed for the study of an inflected language. Just how much such practice transfers to other situations, however, is a disputed question. In any case, a specific item that is being taught can be emphasized by employing concomitant variations. The learner can thus get practice in identifying a direct object, a metaphor, a distortion, or a value, whether it is found in a poem, a novel, an advertisement, or an insurance policy.

Whether he will be able to identify the significant items about which he has not been directly taught is a question. He will probably learn to see what is interesting to him, and what is to his interest, so that, if he is sufficiently intelligent, he can determine what shall be for his profit and what for his loss—unless the selling talk is too clever or the "old shell game" appears in a new guise. However, it is no less important to teach pupils to look for the significant in the words they see and hear than it is in the objective patterns of sight and sound.

In Summary

If children are going to learn to make the right responses, they must

also learn to "see" the right things to respond to. This matter is likely to be overlooked in teaching, since the teacher sees them so clearly that it may not occur to him that the pupils don't know just what he is looking at or what he is talking about.

Learning to perceive involves not only sensory discrimination but also learning what to respond to among things discriminated. A stimulus, through its very prepotency, is apt to be a determining factor in response, though it may be a false guide until pupils learn to perceive the significant stimulus or relationship and to make it prepotent through the processes of experience, purpose, and expectancy. The significant stimulus may be a complex pattern of relationships which can be abstracted from the others only by practice aided by skilled instruction.

Perceptual patterns may be spatial in two or three dimensions. The question, "Do you see what I see?" is not always answered in the affirmative, for figure and ground are constantly shifting, and one must learn to structure the space with which he is dealing. Perceptual patterns may likewise be temporal as well as spatial, or combinations of both, in which latter case matters of movement and timing are important to learn about. Good instruction, repeated experience with concomitant variations in the environment, and pointing, supplemented by sensory aids, help the learner to identify the significant patterns.

In general, the same principles apply to the identifying of "ideas," that is, of conceptual patterns. The response, verbal or otherwise, that an individual makes to words depends on what they mean to him, which comes from the experiences he has had with them. The building of concepts, that is, the formation of correct conceptual patterns for words, is the teacher's big job. It is probable that a disproportionate amount of school time has been spent on syntactical relationships in comparison with what is needed for semantic and pragmatic implications. Words by themselves are not the same as words in context. Learning to identify significant conceptual patterns requires the ability to select and relate at the level of associative and reflective thinking.

Questions

1. Distinguish sensation, sensory acuity, sensory discrimination, and sense perception.
2. What conditions lead an individual to respond to one of a number of stimuli in a situation?
3. What was the contribution to the development of perceptual methods in education of Itard, Séguin, Montessori, Herbart, Froebel?

4. What is the meaning of abstraction? configuration? closure? individuation?
5. To what extent do you believe perception of form is a native function and to what extent the product of experience?
6. How is the discontinuous perception of parts of a figure a factor in a student's progress in plane geometry?
7. How can the whole be more than the sum of its parts? How can the nature of a part depend on the whole of which it is a part? How can the whole determine the activities of the parts? Cite illustrations.
8. How can visual and auditory aids and excursions be advantageously employed in the subject or grade level you plan to teach?
9. Show ways in which an understanding of what is happening depends in part on what has happened and in part on what is going to happen.
10. Explain how the correct way to toss a ball for a serve in tennis can emerge as a figure on a ground.
11. In a subject which you teach or are preparing to teach, what perceptual patterns need particular attention through the use of repetition and emphasis?
12. What is meant by concomitant variations? Illustrate in connection with some school subject.
13. Illustrate ways in which facial expression and vocal inflection may be parts of the pattern to be perceived if one is to get the meaning of what is said.

Readings

The recent work on perception has been done largely by the Gestalt school. For an elementary treatment see

Köhler, W. *Gestalt Psychology*. New York: Liveright, 1929, Part III.
Wheeler, R. H., and F. T. Perkins. *Principles of Mental Development*. New York: Crowell, 1932, Chapter VIII.

Shorter treatments of the subject may be found in

Heidbreder, E. *Seven Psychologies*. New York: Appleton-Century, 1933, Chapter IX.
Murchison, C. (Ed.) *Psychologies of 1925*. Worcester: Clark University Press, 1927.
Murphy, G., and F. Jensen. *Approaches to Personality*. New York: Coward-McCann, 1932, Chapter I.
Woodworth, R. S. *Contemporary Schools of Psychology*. New York: Ronald Press, 1931, Chapter IV.

A number of ambiguous figures and visual illusions are presented by
Luckiesh, M. *Visual Illusions*. New York: Van Nostrand, 1922.

A great deal of valuable material in the field of audio-visual material and techniques is available, among which the studies of the Committee on Motion Pictures in Education of the American Council on Education are noteworthy.

Atyeo, H. C. *The Excursion as a Teaching Technique.* New York: Columbia University, Teachers College, 1939.

Brunstetter, M. R. *How To Use the Educational Sound Film.* Chicago: University of Chicago, 1937.

Dale, E. *Audio-Visual Methods in Teaching.* New York: Dryden, 1946.

Laine, E. *Motion Pictures and Radio.* (The Regents Inquiry.) New York: McGraw-Hill, 1938.

Levenson, W. B. *Teaching through Radio.* New York: Farrar and Rinehart, 1945.

McKown, H. C., and H. B. Roberts. *Audio-Visual Aids to Instruction.* New York: McGraw-Hill, 1940.

Noel, F. W. *Projecting Motion Pictures in the Classroom.* Washington: American Council on Education, 1940.

Rand, H. M., and R. Lewis. *Film and School.* New York: Appleton-Century, 1937.

Seaton, H. H. *A Measure for Audio-Visual Programs in Schools.* Washington: American Council on Education, 1944.

Selected Educational Motion Pictures: A Descriptive Encyclopedia. Washington: American Council on Education, 1942.

Tower Hill High School Staff. *A School Uses Motion Pictures.* Washington: American Council on Education, 1940.

Association and Conditioning

The Nature of Associative Learning. Thus far, the process of learning to perceive and discriminate sensory patterns has been described. The question now arises as to how an individual learns to make the "right" response to a stimulus pattern that he has already learned to perceive. He has previously learned to make many responses, but they must be connected to different stimuli. Many of them are verbal or numerical stimuli. And when they are presented as words or numbers he must be able to respond in the correct way, in thought, word, or action, as the case may be. For example, a child has learned to recognize a cat and he has developed enough oral skill to say "cat" when he sees one. How does he learn to say "cat" when he sees the letters, C-A-T? The word must somehow become a *substitute stimulus*, taking the place of the animal. Or, if the situation is viewed the other way around, he must learn to make a *substitute response* to the letters C-A-T, a response that is different from what he might have made before he learned the verbal symbol. The process of making such substitutions is called associative learning and will be discussed in this chapter.

1. THE LAWS OF ASSOCIATION

The Association of Ideas. It really makes very little difference, psychologically, whether the word is cat, chât, or Katze, or any other symbol, so long as the child responds by thinking of the animal when he sees the symbol that his culture had decided shall stand for that animal. But how does one come to think of an animal, or any other object or concept when he sees or hears a symbol that is in no way like it? Or, more broadly, how does any experience we have make us think of some earlier experience? This problem has long been worked over, particularly by successive generations of British psychologists, though Aristotle was the first to enunciate the basic principles involved, which have come to be

called the *laws of association*. Aristotle's brief statement is as follows:

Whenever, therefore, we are recollecting, we are experiencing certain of the antecedent movements until finally we experience the one after which customarily comes that which we seek. This explains why we hunt up the series, having started in thought either from a present intuition or some other, and from something either *similar* or *contrary* to what we seek or else from that which is *contiguous* with it. . . . For as regular sequence of events is in accordance with nature, so, too, regular sequence is observed (in consciousness), and here *frequency* tends to produce [the regularity of] nature.[1]

Thus the association of ideas by similarity, contrast, and contiguity is enunciated, with frequency as a condition. David Hartley (1705–1757) distinguished the concepts of contiguity in space and time as follows:

We may therefore distinguish association into two sorts, the synchronous and the successive. . . . Thus the sight of part of a large building suggests the idea of the rest instantaneously; and the sound of the words which begin a familiar sentence, brings the remaining part to our memories in order, the association of the parts being synchronous in the first case, and successive in the last.[2]

James Mill (1773–1836) later elaborated this distinction when he wrote:

The synchronous order, or order of simultaneous existence, is the order of space; the successive order, or order of antecedent and consequent existence, is the order in time. Thus the various objects in my room, the chairs, the tables, the books, have the synchronous order, or order in space. The falling of the spark and the explosion of the gunpowder, have the successive order, or order in time.[3]

Both Aristotle and the British associationists were more concerned with tracing their own trains of association than they were in discovering under what conditions associations are made. Later experimental studies have rather consistently employed the synchronous and the successive presentation of stimuli; but, whether they are presented simultaneously or in immediate succession, both are contiguous experiences.

[1] Aristotle, *The Parva Naturalia: De Memoria et Reminiscentia*, edited by J. A. Smith and W. D. Ross, Oxford: Clarendon Press, 1908, pp. 451b–452a.

[2] David Hartley, *Observations on Man, His Frame, His Duty, and His Expectations*, London: Thomas Togg and Son, 1834, Chapter I, Sec. II, Prop. X, pp. 41–42.

[3] James Mill, *Analysis of the Phenomena of the Human Mind*, London: Longmans, Green, 1878, Vol. I, Chapter III, p. 71.

It has been shown that contrast is a special case of similarity, since objects to be contrasted must have certain characteristics in common, and it is the differences in the amount or quality of these characteristics that may be contrasted, such as degrees of intelligence, for example, or of personal attractiveness, or of height. James Mill made the point that associations by similarity and contrast are both made by the repetition of sensations in conjunction with one another:

A dwarf suggests the idea of a giant. How? We call a dwarf a dwarf, because he departs from a certain standard. We call a giant a giant, because he departs from the same standard.[4]

Similarity and contrast, then, turn out to be a special case of contiguity, not only because "we are accustomed to see like things together," but also because they have elements in common. A condensation of the laws of association, bringing them all under a single law of contiguity, can be charted thus:

similarity				
contrast	}	similarity		
			}	contiguity
space		contiguity		
succession	}		}	
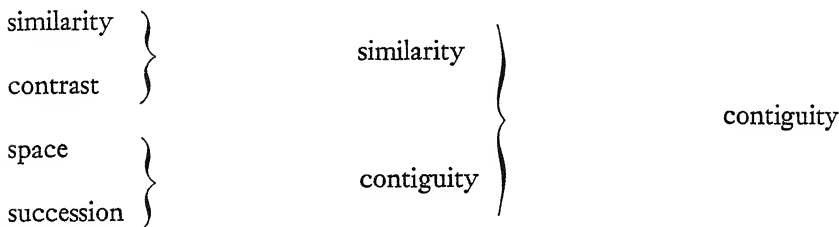
The law of contiguity may be stated as follows: An association is formed between experiences that occur close together in space or in time.

Several supplementary principles have been elaborated by James Mill and others, including frequency or repetition, recency, and vividness. Aristotle mentioned *frequency*, it is implied in Berkeley's "customary connexion," and is explicit in Hartley's Proposition X:

Any Sensations A, B, C, etc., by being associated with one another a sufficient Number of Times, get such a Power over the corresponding Ideas a, b, c, etc., that any one of the Sensations A, when impressed alone, shall be able to excite in the Mind, b, c, etc., the Ideas of the rest.[5]

James Mill illustrated the principle of frequency or repetition, which he

[4] *Ibid.*, p. 114.
[5] David Hartley, *ibid.*, pp. 41–42.

considered "the most remarkable and important cause of the strength of our associations," as follows:

The word mamma, for example, in conjunction with the sight of a woman, would produce no greater effect on the child, than the conjunction of any other sensation, which once exists and is gone forever. But if the word mamma is frequently pronounced, in conjunction with the sight of a particular woman, the sound will by degrees become associated with the sight; and as the pronouncing of the name will call up the idea of the woman, so the sight of the woman will call up the idea of the name.[6]

The *vividness* of the associated feelings James Mill considered with frequency to be "the causes of strength" in association, the "most remarkable cases" being "those of pain and pleasure." Similarly, *recency* adds strength, since "with most persons, time would weaken, and at last dissolve, the association."

The associationists were concerned primarily with *ideas*, as the above quotations show, but they included affective and emotional experiences in their scheme of things as well. The following paragraph from John Locke (1632–1704) in spite of its seventeenth-century tone has a distinctly modern ring:

Many children imputing the pain they endured at school to their books they were corrected for, so join those ideas together that a book becomes their aversion, and they are never reconciled to the study and use of them all their lives after; and thus reading becomes a torment to them, which otherwise possibly they might have made the greatest pleasure of their lives.[7]

Associative Shifting. The British associationists were what have been called "armchair psychologists." Essentially philosophers, they included psychology within their province, and studied and reported the operation of their own minds. Unconcerned about a random sampling from which to draw their conclusions, they elaborated principles to which the laboratories have given greater precision. It apparently did not occur to them to try out their conclusions on animals or on other human beings. If they had, they might have been more concerned with responses. The principle of associative shifting extends the law of association of ideas to the field of voluntary response.

[6] James Mill, *ibid.*, p. 88.
[7] John Locke, *An Essay Concerning Human Understanding*, Philadelphia: Troutman and Hayes, 1850, Book 2, Chapter XXXIII, p. 263.

In the seventeenth century Thomas Hobbes had written: "According to this example, the mind may run almost from anything to anything." In the twentieth century, E. L. Thorndike wrote: "We may get any response of which a learner is capable associated with any situation to which he is sensitive." It took nearly three hundred years to make the transition from the introspective tracing back of a train of associations to the investigation of the process of establishing a response to a particular stimulus. Thorndike illustrated the principle thus:

One holds up before a cat a bit of fish, saying, "Stand up." The cat, if hungry enough, and not of fixed contrary habit, will stand up in response to the fish. The response, however, contracts bonds also in the total situation, and hence to the human being in that position giving that signal as well as to the fish. After enough trials, by proper arrangement, the fish can be omitted, the other elements of the situation serving to evoke the response. Association may later be further shifted to the oral signal alone.[8]

It is not necessary to assume that the cat associates the idea of the fish with standing on his hind legs. Indeed, even in human beings responses to certain stimuli which have become automatized can be made without any discoverable ideation whatsoever, as, for example, when an officer gives the command to halt, or when a typist copies a page of manuscript without thinking about the letters or the words or the meaning of the sentences she is copying. Also, in less highly automatized behavior, individuals learn to respond to certain situations such as words, the presence of other people, or of objects, without consciously calling up trains of associations. The action is short-circuited, responses are made to "cues," that is, to parts of total situations, without any particular thought, unless there is some blocking or frustration, when other cues are apt to be responded to.

2. The Association Experiment

Reaction-Time. Another line of approach to the study of association is to be found in the experiments on the speed with which the response can be made. In these experiments there has been a varying emphasis. In some, the brief period of elapsed time between stimulus and response has been emphasized; in others, the directions given to the subject; and in still others, the nature of the response made.

[8] E. L. Thorndike, *Educational Psychology*, Vol. II, *The Psychology of Learning*, New York: Teachers College, Columbia University, 1913, 1921, p. 15.

These phases all appear in the familiar situation of the start of a race, the illustration used in the chapter on motivation. Sometimes the runners are not all off together. Perhaps some anticipated the signal and started before the gun went off, while others did not get under way for nearly a second. All had had practice with the starting signal. And all knew what they were supposed to do when it was given. The same phenomena can be illustrated in the classroom. The instructor gives the following directions: "As soon as I tap with my pencil on the desk, all of you tap once with your pencils." The ensuing rattle demonstrates the existence of individual differences in reaction-time.

The experimental study of the phenomena involved in reacting promptly to a specific stimulus, continuing over a period of more than a hundred years, has had a most interesting and fruitful history. It began in 1795 when an assistant astronomer in the Greenwich Observatory was discharged because of errors as high as 0.8 second in his records of the time of transit of stars across the meridian. Later, differences in similar observations made by two trained astronomers were found to equal 1.04 seconds, and this "personal equation," as the phenomenon came to be called, began to attract considerable attention among astronomers, who gradually developed a more satisfactory apparatus and technique with the result that the discrepancies were decidedly reduced, and the problem was taken over by those interested in the newly developing science of psychology.

Fifty years later, Helmholtz, using the time taken to react to a stimulus as the indicator, discovered that the speed of a nerve current is not instantaneous, but that it travels only about thirty meters a second. When, however, he transferred his attention from the motor nerves and muscles of a frog to the reactions of human subjects, he found such great variability not subject to experimental control that he gave up: the interest in individual differences had not arisen.

Long after the Greenwich episode, chiefly in the German psychological laboratories, it was found that the variations in reaction-time are due in part (1) to the different sense avenues, which showed characteristic differences, and (2) to the kind of experimental procedure followed. The experimenter might call for a *simple reaction:* "depress this key as soon as you see the flash of light"; a *choice reaction:* "depress the right-hand key if you see a red light, the left-hand one if you see a green light"; or a *discrimination reaction:* "if you see a red light, depress the key; if a green one, do nothing." The first way was the quickest. Later experimenters found that (3) the speed varied as the subject directed his attention to the response to be made (motor attention) or to the expected

signal (sensory attention). Table 12 illustrates these differences in thousandths of a second.

TABLE **12** *Reaction-Time Differences*

	Motor Attention	Sensory Attention
Sight	.180	.290
Sound	.120	.225
Touch	.105	.210

Many ramifications of this experiment have developed. Some studies have been focused on the varying length of time taken by a subject to respond to different stimulus words with the first word each calls to mind, the longer reaction-time supposedly being due to a lack of willingness on the part of the subject to divulge his secret thoughts.

The response words, too, have been the object of study, notably by Jung, to give an indication of the customary experiences or habitual associations of a subject or patient. After a delay of unusual length, an irrelevant response, especially of some significant word connected with some emotional experience, has been supposed to indicate a repression. This formed the basis for Münsterberg's abortive efforts to test complicity or guilt on the witness stand, and for the later development of the "lie-detector," which records changes in breathing and pulse rate in conflict situations. Too many irrelevant verbal responses have been thought to be evidence of a diseased mind, relevancy being based on a chart of the frequencies of responses to one thousand common words.[9] But a serious-minded experimenter might well call irrelevant certain associations which to the poetically minded person are natural and fundamental.

System and Sequence. With the introduction of directions given to the subject, the simple association becomes more complicated. It is one thing to write "cat" and have a child say the word and think the right animal. But something else is added when the directions are: "What do you think of when the following word is pronounced? Cat." This is the *free-association* technique, and it is assumed that the subject understands the meaning of the word and will respond by saying "dog" or "bat" or "fish" or something else. Such responses have been classified

[9] A. J. Rosanoff, *Manual of Psychiatry*, New York: Wiley, 1920.

according to the logical *system* they illustrate. A number of relations commonly occur, such as *synonyms*, "bright—shiny"; *antonyms*, "night—day"; *modifiers*, "dog—big"; *rhymes*, "bill—hill"; *part whole*, "table—leg"; *subordination*, "tree—oak"; and *supraordination*, "chair—furniture."

Other responses illustrate what might be expected to be more common according to the principle of contiguity, namely, *sequence*. "Fish" would be such a response to "cat," or "night—fall" instead of "day," "boat—man" instead of "ship," and so on. If the stimulus word is an adjective, the sequential responses become more frequent, and still more frequent if preceded by the article, "a" or "the." The sequence is the more elementary association, while the systematic associations are more gradually built up.

So important, however, are the various systematic relationships that they are used as indicators of intelligence. As we have seen, the synonym-antonym test appears frequently on intelligence examinations, and Spearman has analyzed the response in his study of the principles of cognition.[10] When two words are given, like "black—white," the response "opposites" reveals the correct process of *eduction of relations*. When the relation and one term are given (give the opposite of "black"), the response "white" reveals the process of *eduction of correlates*. Similarly, relations and correlates may be educed from other logical systems, such as those given above.

Set. Some of the more profitable variations in the experimental technique of the association experiment are due to the work of James McKeen Cattell, who had been a student and then an assistant of Wundt. Wilhelm Wundt (1832–1920), who founded the first psychology laboratory at Leipzig in 1879, and whose contributions extended from physiological to social psychology, had standardized the technique of the association-reaction experiment. With it he attempted to demonstrate three stages between stimulation and response, as he believed they existed: (1) perception of the stimulus, (2) apperception or focusing the attention upon it so as to give it meaning, and (3) will to react to it.

This supposedly logical sequence, however, did not seem to agree with the findings. The will or attitude factor got in before the stimulus was given. And the psychologists who conducted their experiments at Würzburg found their subjects hard put to it to report accurately as to what happened between the presentation of the stimulus and the response. For the experiences did not appear as sensation or imagery at

[10] C. E. Spearman, *The Nature of Intelligence and the Principles of Cognition,* London: Macmillan, 1923. (2nd ed., 1927.)

all, but rather as *attitudes* dependent on the task or problem (*Aufgabe*), which, though not conscious, exerted an influence upon the response. The presence of unconscious, determining attitudes was suspected and later received experimental confirmation.

The implications of these findings have been discussed in Chapter IV. Out of them have come the consideration of incentives, which are so important in all school learning situations, and the recognition that the directions, whether given by the teacher or perceived in the situation by the learner, produce a set and constitute an important part of the stimulus to which he makes his associative response.

3. The Conditioned[11] Reflex

The Classical Conditioning Experiments. A further extension of the principle of association was made to include the responses of the visceral muscles and glands innervated by the autonomic nervous system and not so subject to voluntary control as are the responses of the skeletal muscles. This was done by certain physiologists, most notable of whom was Ivan P. Pavlov (1849–1936). He and his collaborators in Leningrad performed numerous experiments on the salivary reflex of dogs as a consequence of which the mechanics of this kind of learning have been considerably clarified.[12]

This work was most acceptable to the Russians since it took the psyche or soul out of psychology, which, as a consequence, came to be called reflexology. It was acceptable to American psychologists, many of whom were dissatisfied with the shortcomings of the British association psychology and its dependence upon the always somewhat vague "ideas." It came to be recognized by the behaviorists as the necessary explanation of learning in harmony with their insistence on objectivity, the importance of environmental to the exclusion of hereditary factors, and their desire to build a system of psychology without consciousness. And it inspired the students of child psychology to a veritable fever of experimentation which, in conjunction with the nursery-school movement, served to broadcast the new word, "conditioning," with the result that, through the agency of parent child-study groups and parent magazines, mothers ceased to think of training their children; they conditioned them!

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[11] The Russian word *ooslovny* means "condition*al*," not "condition*ed*." Since the reflex depends for its appearance on certain antecedent conditions, "conditional" more nearly expresses the correct meaning. The form "conditioned," however, has the sanction of common usage.

[12] I. P. Pavlov, *Conditioned Reflexes* (translated by F. C. Anrep), London: Oxford University Press, 1927. Also *Lectures on Conditioned Reflexes* (translated by W. H. Gantt), New York: International Publishers, 1928.

In view of the relatively small revision that the concept of conditioning actually produced in the realm of systematic psychology, its reverberations were enormous, and undoubtedly there resulted a substantial gain in the intelligent handling of children, the proper control of their emotional life, and the development of desirable attitudes.

The principle of the conditioned reflex is the same as that of associative shifting as shown in Thorndike's illustration of the cat and the fish. It may be diagramed as follows, using Pavlov's famous dog-and-bell set up:

Substitute or
conditioned
stimulus (bell)

$S_1 \longrightarrow R_1$

Original or
unconditioned
stimulus (meat)

$S_2 \longrightarrow R_2$
(Salivation)
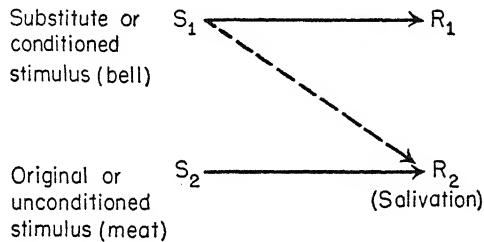
A bell, S_1, the ineffective or "conditioned" stimulus, is sounded, in response to which there is no salivary response, only a pricking-up of the ears, perhaps. Then meat, S_2, the originally effective or unconditioned stimulus, is shown to the dog, and this stimulus produces the salivary response. Thirdly, S_1 and S_2 are presented *simultaneously*, which, through the agency of the meat stimulus, results in the salivary flow. Fourthly, these steps are *repeated* several times. After a number of such repetitions, when the bell stimulus *alone* is presented, a flow of saliva follows the conditioned stimulus though the bell was formerly not thus effective. S_1 has become a *substitute stimulus* and R_1 a *substitute response*. To the unconditioned reflex (meat—salivation) has been added the conditioned reflex (bell—salivation), one which is conditioned by or dependent upon the preceding learning process.

The principle may be stated as follows: If a formerly ineffective stimulus is repeatedly presented simultaneously with an effective stimulus, the response made to the latter may be elicited when the former alone is presented.

Of course, the actual experimentation is not so simple as the diagrammatic representation. The apparatus used is very complicated, so that the dog will not be distracted by any other stimuli. He is placed in a restraining harness in a virtually sound-proof room, and the different visual stimuli are presented to him by means of a system of pneumatic

tubes which operate a circular revolving lid with a large notch, almost
a quadrant cut out of it, the opening to which may be made to stop
over the dish containing the stimulus desired. The experimenter thus
controls the stimulus from outside the little room, observing the dog
only through a small periscope arrangement which does not allow him
to be seen by the experimental animal. He reads the extent of the
salivary flow from a tube gauge marked off in units of cubic centimeters.
This is connected with the salivary duct through the cheek of the dog
by means of what is called the *chronic fistula*, a minor operation in the
first place, and one which causes the dog no inconvenience when the
experiment is in progress. Indeed, the whole experimentation is most
humane, at least if one may judge from the fact that the dog so readily
becomes "conditioned" to the situation that when the door is opened
he at once jumps up on his little table and waits to be buckled into the
apparatus.

Other investigators have introduced many variations into the condi-
tioning experiments, but all are primarily aimed to study intensively
just what happens in the period of contiguity of two sensory experiences,
the period in which "ideas" are recollected according to the association-
ists, and during which occurs what has been described in rather general
terms as substitute response by Thorndike and other American objective
associationists. Many experimental animals have been used, among them
snails, fish, pigeons, rats, sheep, dogs, and monkeys, as well as human
subjects. Many different reflexes have been conditioned, mouth move-
ments, limb flexion, electro-dermal response, and the eyelid and pupillary
reflexes being perhaps the most widely used. Different unconditioned
stimuli have been selected appropriate to the various responses—food,
electric shock, changes in illumination, a puff of air (for the eyelid
reflex), and others. The nature of the conditioned stimulus used also
varies. Sometimes it is, like the bell, one with a sharp onset which stops
before the unconditioned stimulus is presented, such as a flash of light,
a click, or a contact stimulus. Sometimes it is a stimulus that continues
until the unconditioned stimulus is presented, such as buzzers, metro-
nomes, horns, lights, and colors. Figure 56 illustrates the kind of record
that is obtained from such experiments.

The time factor in conditioning has also been carefully investigated.
For the sake of simplification, the phrase "simultaneous" presentation
was used, but the conditioned stimulus must actually begin at least a
fraction of a second before the unconditioned stimulus. The time
between the two stimuli may be lengthened; but the conditioned response
appears after approximately the same length of time following the onset

of the substitute stimulus as that required when the original stimulus was given to set it off. In fact, it has been found that when an animal is fed at thirty-minute intervals, the salivary response will occur (without the food) in approximately thirty minutes.

While many conditioned responses are apparently much the same as the unconditioned responses for which they have been substituted,
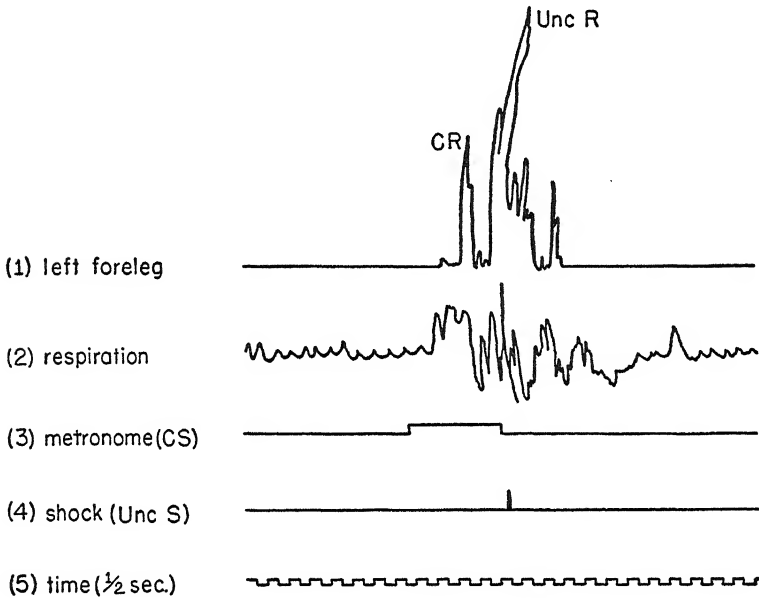
Figure 56. The Pattern of the Conditioned Response The diagram shows a kymograph record of the eleventh presentation of a metronome (substitute or conditioned stimulus, *CS*) combined with an electric shock (original or unconditioned stimulus, *Unc S*) delivered to the left foreleg of a sheep. The metronome beats once a second for 5 seconds prior to the shock. Both the conditioned leg movements and respiratory changes began while the metronome was sounding, anticipating the shock. These conditioned responses (*CR*) may be distinguished from the unconditioned responses (*Unc R*) following the shock. (After H. S. Liddell, from E. R. Hilgard and D. G. Marquis, *Conditioning and Learning*, New York: Appleton-Century, 1940, p. 30.)

others are quite different. Figure 56 shows differences in intensity and duration. Some conditioned responses are just a part of the unconditioned response—salivation without chewing (for food), or barking (for electric shock). Others can be described as preparatory responses. The condi-

tioned stimulus produces a set, so that the animal is in a state of readiness for the unconditioned stimulus when it appears.

A number of inhibitory influences have also been studied. It is found that, when the dog has been conditioned to a certain stimulus, a repetition of this stimulus with no consequent opportunity to eat—that is, without reinforcement—causes the reflex gradually to disappear. The vanishing of a learned response through repetition does not mean, however, that the conditioned reflex has actually been lost, for it will appear again usually after an interval of about two hours, or when the stimulus conditions are changed.

The conditioned-reflex technique has been widely used as a means of experimenting on animals, to discover, for example, their ability to discriminate different colors and tones by conditioning them to one value and then presenting another. If the second fails to elicit the substitute response, clearly it must be differently sensed by the animals. If the second does elicit the same response as the first, the stimuli are not differentiated, instead they are equivalent or the response is generalized.

More important from the point of view of human learning, however, are its implications for education. For any stimulus may thus be made to call out almost any response ($S_1 - R_3$, $S_1 - R_4$, etc.), as when a "No" may produce not only compliance, but anger, fear, tears, or no noticeable effect whatever. Also, a stimulus once conditioned ($S_1 - R_2$) may then act like the original unconditioned stimulus ($S_2 - R_2$) as a basis for further conditioning ($S_3 - R_2$, $S_4 - R_2$, etc.), and so a whole chain of stimuli may gradually be made to produce the same response. This is just what happens in the training of children to stop what they are doing when they are told, "No-no," when they are frowned at, or when someone shakes his head at them.

The Nature of the Conditioning Process. The term conditioning has come to designate not only the involuntary glandular responses and those innervated by the sympathetic nervous system but the voluntary responses acquired by the process of associative shifting as well. Hence, the term conditioned response is preferable to conditioned reflex. Conditioning has been put forward by some as the basic principle of all learning. This, however, seems to be too extreme a claim, for the experimentation permits a very restricted range of stimuli to operate, allowing no room for perceptual selection, and only one response or a very limited number of responses is observed. Furthermore, conditioning experiments uniformly involve the substitution of other stimuli to call out inherited or previously acquired pattern reactions that were not

formerly called out by those stimuli; thus conditioning does not account for the acquisition of new muscular coordinations. Meanwhile, certain details of the associative or conditioning process have received a great deal of attention experimentally, details which are of great practical concern in the actual school situation. For convenience, they may be grouped under two heads: exercise or repetition, and effect or reinforcement.

4. Principles of Associative Learning

Exercise. The basic importance of the principle of exercise, which appears under such varied names as *frequency, repetition, use, practice,* and *drill,* has already been mentioned in connection with the principles of association and conditioning. As drill, it has always had its place in the school, taking on many colors from its different environments all the way from the unison sing-song method of the old Chinese education to the play-motivated activities of modern progressive schools. Such experiments as have been performed, chiefly with the fundamental processes in arithmetic, demonstrate the desirability of short, highly motivated drills lasting not more than five or ten minutes at a time if the child is to automatize these connections. Experiments have shown from 10- to 15-per-cent improvement above that made by the control group when children have been so drilled for a period of a month or two, and a similar superiority of improvement of the experimental group has been shown in speed of silent reading.

The principle of repetition, extolled by James Mill as the most important cause of the strength of associations, included by Thorndike as one of the three basic principles of learning, and introduced by Pavlov as a necessary part of conditioning experimentation, has undergone serious criticism. The associationists pointed out that "intensity," apparently what Thorndike calls "impressiveness," often reduces or eliminates the necessity for repetition. However, it still seems necessary to repeat responses to many stimulus situations if they are to be learned, perhaps because so many lack intensity or impressiveness. For example, children do not as a rule acquire the word meanings in their own or any other language upon one presentation.

The three logical possibilities residing in the repetition situation have been set forth by Dunlap as three postulates.[13] What he called the alpha postulate is as follows: "A response to a given stimulus pattern definitely *increases* the probability that on the recurrence of the same, or sub-

[13] Knight Dunlap, "A Revision of the Fundamental Law of Habit Formation," *Science,* vol. 67 (April 6, 1928), 360–362.

stantially the same, stimulus pattern, the same, or approximately the same, response will occur." This is a statement of the usually accepted principle of exercise or repetition in habit formation. According to the beta postulate, the "response, in itself, has *no* effect on the future probability of the same stimulus pattern producing the same response." The gamma postulate is the opposite of the alpha, the "response *decreases* the probability."

There is considerable evidence that the alpha postulate is really not true, and that the beta postulate may be, or, in other words, that repetition of itself has no influence on learning but merely provides the opportunity for other conditions to operate. An analogous situation would be the superstitious belief frequently encountered of the danger of breathing the night air, when the danger, if any, was in the mosquitoes or other disease-carrying creatures that may have operated more effectively at night. Every student has had the experience of reading over a passage without knowing what was in it while his "mind was woolgathering." Experimenters who have pronounced the same words or nonsense syllables to several subjects many times over have reported that they did not learn the syllables though the subjects did.

In order to test a situation in which frequency alone was operating, Thorndike devised the following experiment.[14] He had subjects try to draw four-inch lines blindfolded. They were to draw with one quick movement or shove of the pencil. After three thousand such lines were drawn, they were no nearer four inches than they were at the beginning, and, furthermore, there was no more tendency in the last half of the experiment to draw the lines of the same length that were drawn most frequently in the first half. The repetition caused no learning. A number of other experiments designed to isolate the learning variable brought the same result.

Belongingness. When experiments were devised to allow conditions other than repetition alone to operate, learning was affected in various ways.[15] Among these other conditions are belongingness, polarity, fatigue, disuse, and effect. The latter will be discussed more in detail in the next section. The meaning of belongingness can perhaps be inferred from an experimental set-up.

A series of rather uninteresting sentences, of which the following are

[14] E. L. Thorndike, *Human Learning*, New York: Century, 1931, Chapter I; and *The Fundamentals of Learning*, New York: Teachers College, Columbia University, 1932, Chapter II.

[15] *Ibid.*, 1931, Chapter II, and 1932, Chapters III, IV.

examples, were read to the subjects a number of times: "Edward Davis and his brother argued rarely. Lincoln Blake and his uncle listened gladly." Then a series of questions was asked: "(1) What word came next after rarely? (2) What word came next after Lincoln?" and so on. To questions like the first, calling for a sequence spanning the end of one sentence and the beginning of the next, only about 2 per cent of the answers were correct—no more than would be expected by chance guessing. In questions like the second, calling for a connection of first and last names, approximately 20 per cent were correct; while a question like, "What word came next after Lincoln Blake and his uncle?" brought 73 and 81 per cent correct responses for two different groups of subjects.

In other experiments, long lists of words were read, each followed by a number, like bread 29, wall 16, and so on. The average percentage of correct responses to the questions like, "What number comes *after* bread?", pairs which had been repeated 18 or 21 times, was 37½ per cent. Whereas the average was only one-half of one per cent for questions like, "What number comes before wall?", though for these pairs there had been 24 repetitions.

These experiments reveal the fact that mere contiguity, even with many repetitions, is not enough to produce learning. The learner, as a result of his reading experience, has developed a set, as a result of which he sees the words that belong together in pairs or in a sentence in a kind of perceptual pattern, and one of them when presented may call up another. But items which do not seem to belong in that pattern, though they may be in direct sequential contiguity, are not associatively connected.

In the conditioning experiments, the number of stimuli is reduced by the experimental set-up, and those which are employed are prepotent. But when any one of a great many stimuli appearing simultaneously or successively may be connected, only those which seem to belong in the same pattern will be. The knowledge of the patterns of words or other items which go together is acquired by experience, and the process can be accelerated by the teacher through the use of the techniques of perceptual learning described earlier. A child may encounter prepositions followed by dative, accusative, or ablative, or participles preceded by subjects in the objective case many times, but, if the sequence is not repeatedly pointed out as belonging together, it will not be perceived and hence not learned.

Polarity. What has been called polarity may be thought of as a special case of belongingness. It is the name for the fact that things are

remembered better in the order in which they are learned. It is extremely difficult if not impossible to do a thing "backwards," whether it is to say the alphabet, or hum a tune. In one experiment, familiar foreign vernacular phrases such as "exeunt omnes," and single words such as "calendar" and "obelisk" were divided in the middle.[16] For half of the items the first part was presented; for the other half, the second part. The forward associations were uniformly more often completed than those in which the last part was given. In some cases the forward associations with the omissions at the end were nearly twice as well remembered as the backward associations when the omissions were at the beginning. Perhaps the most significant application of the principle of polarity is to be found in the learning of the "tables" of addition, subtraction, multiplication, and division. Educators finally discovered for themselves that children who knew what 9×7 is might be stalled on 7×9 and even have to start the "table of 7's" at the beginning to get the answer. The number combinations have to be learned "forwards and backwards" apart from the tables to be useful. Fortunately, spelling doesn't have to be learned in this way, but word meanings do, and event sequences in the natural and social sciences have lines of relationship running from effect back to cause, and matters taken up in the later part of a course are often directly related to those studied earlier. If backward associations are desired, it will usually be necessary for them to be pointed out by the teacher, for they will probably not otherwise be made.

Interval and Fatigue. Periods of practice, whether short or long, imply intervals between practice periods. Continuous practice produces fatigue, and just how long a class or a person can drill on one thing before fatigue sets in with its diminishing returns has not yet been satisfactorily investigated. The experimental studies favoring short periods of five or ten minutes are due in part to their experimental convenience and in part to the functions studied. It seems pretty clear that we have a different phenomenon from the one which appears in the performance of physical tasks, distinguished from it by the name *mental fatigue.* Its physical basis is certainly not entirely muscular, though over long periods of time eyestrain and the tensions of bodily posture contribute to it. It may be cortical.

But, whatever it is, there is no doubt of its existence; and the reluctance of one experimenter to repeat the experiments on herself in the mental multiplication of four-place numbers by each other is as readily under-

[16] *Ibid.,* 1932, Chapter VII.

stood as her heroism is widely acclaimed.[17] She worked at this monoto-
nous task continuously from 11:00 A.M. to 11:00 P.M. on four successive
days. Nothing approaching mental exhaustion was found, though her
efficiency was reduced about a half. There is no means of knowing what
would have happened had she kept on for several more days or weeks.

In such a task, besides the noticeable *decreased capacity for work*—the
usual definition of fatigue—there is a positive dislike and a strong desire
to shirk if possible, a realization that life holds more interesting things,
and a revolt against the boredom of such endless monotony. Three hours
in a treadmill and the same time and energy expended on a hike through
fields and woods may be identical in foot-pounds exerted, but they are
quite different in the attitudes they arouse. The one demands the whip
of an overseer; the other is its own motivation. Thus, while drills for
mechanical perfection in the fundamental processes, foreign language
vocabularies, necessary formulas or definitions, and the like, should be
"short and snappy," the amount of time spent in exploring these subjects
and following out their many ramifications through reading, translating,
experimenting, and the like can be much greater. For here, successive
ten-minute periods are not repetitions of the same task, but are different
tasks, and the very diversity wards off ennui.

The usual school program allots forty-five to fifty minutes to one
subject, with intervals of five or ten minutes before the new set of tasks
is begun. Interesting studies could be made in schools organized under
the Dalton plan to discover how long children of different ages keep
themselves busily engaged in different kinds of tasks. It is a thing in
which improvement is possible by the elimination of distracting factors
and the resolve of the pupil, an improvement toward which the school
should strive to contribute its share.

Experiments in which school children have been given standardized
tests at different times of day show that there is little or no decreased
capacity for work as the day rolls on. Scores in the late morning and
midafternoon are as a rule higher than those at the noon hour and at
8:00 and 5:00, while the last two are about equal. Where there is a
decline, it has been attributed to such things as poor ventilation, on the
one hand, and boredom, on the other. Unfortunately, these experiments
are far from conclusive. There has been no adequate control of the effort
expended, which is therefore assumed to be constant. That the beginning
and the end of each session is low might perhaps be attributed to the
school organization and group attitude rather than to the course of the

[17] Tsuru Arai, "Mental Fatigue," *Teachers College Contributions to Education*,
No. 54, 1912.

sun or the pupils' labors. In all probability, if school started at 10:00 and closed at 3:00, with breakfast first and no luncheon recess, the diurnal course of efficiency might shape its curve quite differently.

Interval and Disuse. Just as the advantage of uninterrupted practice if too long continued is offset by the effect of physical or mental fatigue, so the positive value to be gained from separating drill periods by periods of no practice is nullified if the interval is too much prolonged and forgetting sets in. James's statement to the effect that we learn to skate in summer and swim in winter is often quoted because it states in his characteristically picturesque fashion the principle of the advantage of periods of no practice. If they were not of advantage, drill for several hours at a time would be the most effective means of learning; yet it is difficult to understand how connections can strengthen themselves without practice.

That they are not very expert in this is shown by the ease of forgetting. But to the extent that the interval is valuable, its effect is probably due to three factors: (1) The elimination of mental fatigue or boredom and the consequent higher degree of attention and enthusiasm given the task; (2) the fading-out of the incorrect connections, the mistakes, each one of which may have been low in frequency and unrewarded, and which as a consequence does not have the survival value of the correct form, which was repeated and rewarded; and (3) greater freedom from the effects of retroactive inhibition (Chapter XIII), as a consequence of which the right responses are not interfered with by too frequent repetition of wrong ones.

5. EFFECT AND REINFORCEMENT

Pleasure and Pain. It has been shown that repetition alone is ineffective in bringing about learning, and that other conditions operating in the process of repeating, namely, belongingness, polarity, fatigue, and disuse have considerable influence. Probably the most influential factor, however, is to be found in the effects of various kinds of rewards and punishments. The evolutionary theories following the work of Darwin are largely responsible for adding the affective, motivational concepts to the overintellectualistic views of the British associationists. It was necessary for the evolutionists to set up some kind of theory to account for the survival of species, and so Herbert Spencer (1820–1903) put forward the proposition that animals continue to do what is pleasant, which on the average is beneficial; whereas, if they did what was painful, this would by the same token be injurious, and in the long run they would

not survive. Such a view is *hedonistic* in that it is based on the pleasure principle; and in his exposition Spencer showed the same concern about consciousness that was noted in the case of the associationists, for he naturally talked the psychological language of his day. In 1871 he wrote:

. . . We substitute for the word *Pleasure* the equivalent phrase—a feeling which we seek to *bring into consciousness* and retain there, and . . . for *Pain* the equivalent phrase—a feeling which we seek to get out of *consciousness* and to keep out.[18]

In 1913, Thorndike wrote:

By a satisfying state of affairs is meant roughly one which the animal does nothing to avoid, often doing such things as attain and preserve it. By an annoying state of affairs is meant roughly one which the animal avoids or changes.[19]

Thus the transition has occurred. First came the consideration of the hedonistic influence of the conscious experiences of pleasure and pain, and as a consequence varied efforts to parallel them with theories of increased or decreased nervous activity or vital energy and to find analogies in beneficial and injurious actions. Later came the behavioral view, which sidesteps the problem of hedonism and which leaves the ultimate question of why some states of affairs are sought and some avoided still unanswered, but which opens the way to experimentation in order that the effect of various states of affairs may be explored and their influence on learning determined.

The Law of Effect. The principle of learning enunciated by Thorndike in 1913, known as the law of effect, is stated as follows: "When a modifiable connection between a situation and a response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased."[20] This means that, when the stimulus again presents itself, the learner is more apt to do again what he did before, providing the situation is one that he would ordinarily not avoid or one that he would move toward or maintain. In more familiar language, rewards facilitate learning, and the response that is rewarded is the one that is more likely to be learned. But the reward need not necessarily

[18] H. Spencer, *The Principles of Psychology*, New York: Appleton, 1885, Vol. I, Chapter IX.

[19] E. L. Thorndike, *op. cit.*, 1913, p. 2.

[20] An annoying state of affairs, it has been found, does not have an equal opposite effect in weakening a connection. See E. L. Thorndike, *op. cit.*, 1932, Chapter IX.

be affectively "pleasant." It may even entail painful consequences; but it must be "satisfying." The reward used with experimental animals is usually food, at times when they are hungry. In schools, commendation by the teacher is commonly used, though pupils do not always consider this so much of a reward as teachers sometimes think.

A number of experiments with adult subjects have been performed in which the experimenter used the word, "Right," as a reward and "Wrong" as a punishment, of which the following will serve as a sample.[21]

Strips of paper, 3, 4, 5, up to 27 cm. in length were presented to subjects one at a time in random order. They were asked to estimate the length of the strips, making comparisons with a 10-centimeter strip placed near-by. About 2 seconds after each estimate made by the members of the experimental group, and after the strip had been removed behind a screen, the experimenter said "Right," if the estimate was correct, and "Wrong," if it was not, without telling whether the estimate was too high or too low. This group reduced its average error 50 per cent ± 5, while for the control group that had the same practice but no statements of right or wrong, the mean reduction of error was 6 per cent ± 12.

Thorndike devised a great many more experiments, including such materials as word pairs, completion tests, and others, and introduced variations in timing, emphasis, number of repetitions, and in other ways. In general, the conclusions are like those of the experiment that was reported: marked improvement in learning the rewarded associations and chance success for the others.

The Confirming Reaction. The question naturally arises as to just what happens, psychologically, to produce these results. One natural explanation is that the subject, being told what is right, "fixes" the association between the stimulus and the correct response he just made by increased attention and mental rehearsing. For example, in one of the experiments, lists of rare English words were presented, and, after each, five possible meanings in the form of a multiple-choice test, thus:

desition crossing......situation......ending......craving......
legal paper
eidolon laziness......benefice......gift.....duck.....phantom

When the subject guessed "ending" and heard the response, "Right,"

21 E. L. Thorndike, *op. cit.*, 1931, Chapters III–V; 1932, Chapters IX–XII.

he might have said over to himself, "Desition—ending, ending—desition, desition—ending," or for eidolon, he might visualize some "phantom" he has seen in the movies. Undoubtedly, many connections are established through repetitions, rehearsals, recall of images, and other representations of the after-effect. In the interest of more effective learning, the more repetitions the better. However, in the experiments, only about a second elapsed between the pronouncement of "Right" or "Wrong" and the presentation of the next stimulus, which would give very little time for such inner rehearsal; and when each stimulus was presented, the subject had to reply at once, so he had no time to stop and think about his earlier associations with each one. Thus it is probable that the satisfying after-effect acts directly, without the necessity of any intermediate recall or rehearsal. Thorndike calls it a kind of "OK," a "yes-reaction," or a confirming reaction. It has even been found to affect the response to the stimuli immediately preceding and following the one to which it is given.[22]

Homogeneous Reinforcement. Support is given the contention concerning the effect of the confirming reaction by experiments from another quarter. It has already been pointed out that the term conditioning has come to be applied not only to the experimental modification of reflexes, as in the classical conditioning experiments, but also to the connection of any response which the subject is able to make with any stimulus to which he is sensitive. In the Pavlovian experiments, food or acid in the mouth served as the original stimulus to the salivary reflex, and, through the conditioning process, the substitute stimulus (the bell, light, buzzer, etc.) when presented alone served to call out the reflex. But the substitute stimulus does not continue to be effective indefinitely, for it suffers extinction unless it is "reinforced" by the unconditioned stimulus—food or acid in the mouth. Such reinforcement strengthens the connection, or re-establishes the conditioned reflex. It is called homogeneous reinforcement because the substitute stimulus and the reinforcement (original stimulus) evoke the same response (salivation). In other words, the reinforcement (food) causes the individual to do naturally what he is learning to do in response to the substitute stimuli.

This is exactly what happens in certain kinds of human learning situations, particularly in the development of emotions and attitudes. A loud noise produces the fear response which will later be made to aspects of the situation connected with the noise. The same is true of stimuli

[22] E. L. Thorndike, *The Psychology of Wants, Interests and Attitudes,* New York: Appleton-Century, 1935.

producing frustration responses, including escape and aggression. Frequently, in these cases, children are learning to respond in ways in which teachers do not want them to respond. But fortunately it works the other way around too, and a child can be conditioned to like, go toward, be near, and later to prize and value things and experiences that were a part of situations to which he originally responded in the unapproved way.

Homogeneous reinforcement takes place when the behavior sought is its own reward. If a child likes to read, he will like the situation in which reading takes place, and opportunities to read will reduce the probability of extinction and reinforce the "liking" response. No "marks" or teacher commendations are necessary, they are entirely extraneous. The same is true for the satisfaction of interests other than reading. The reason for the effectiveness of the emphasis of educational method on the child's interests and needs is largely to be found in this direct, homogeneous conditioning process. The activity continually rewards itself. It is its own reinforcement.

Heterogeneous Reinforcement. For many responses, however—even granting a basic positive attitude—homogeneous reinforcement does not apply. The natural response to food or commendation is not a French verb form or a date in history. The response the pupil makes to the new situation, if correct, must bring about a satisfying state of affairs if it is to be connected with it, and wrong responses must fail to bring satisfaction. The reinforcement takes the form of a reward, and the rewarded response tends to be repeated when the situation recurs. A great number of experiments have been performed that have served to clarify certain aspects of this kind of learning. The beginning of this experimentation and the founding of comparative psychology is Thorndike's doctoral dissertation at Columbia University, which appeared in June, 1898, when he was a young man of twenty-three. It is entitled *Animal Intelligence, an Experimental Study of the Associative Processes in Animals.*

Thorndike's monograph contains the first description of a *maze-learning experiment*. Simple and crude perhaps it was in comparison with the elaborate apparatus employed nowadays, but it was the beginning.

The walls were made of books stuck up on end. . . . A chick was placed at A and left to find its way out. [Figure 57] . . . When taken from the food and other chicks and dropped into the pen he shows evident signs of discomfort; he runs back and forth peeping loudly, trying to squeeze through any openings there may be, jumping up to

get over the wall. [Finally he runs out the right way, which he does more efficiently in successive trials, as shown in the sample time-curves (Figure 58).] In scientific terms this history means that the chick, when confronted by loneliness and confining walls, responds by those acts which in similar conditions in nature would be likely to free him. Some of these acts lead him to the successful act, and the resulting pleasure stamps it in. Absence of pleasure stamps the others out.
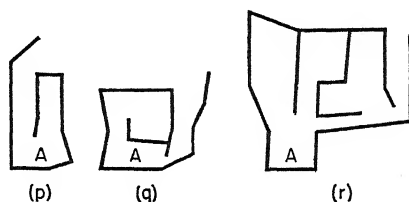
Figure 57. Ground Plan of the First "Pens" or Mazes Used in Experimentation in the Learning of Animals (E. L. Thorndike, "Animal Intelligence," *Psychological Review, Monograph Supplements,* vol. 2, No. 4, 1898.)

We have already seen how this oversimplified hedonistic explanation has been modified.

The following year Small began to publish the account of his experimentation for which he used the maze shown in Figure 59. This is an adaptation of the labyrinth, with its high hedges for walls, which has long amused visitors in the gardens of Hampton Court. Small's subjects
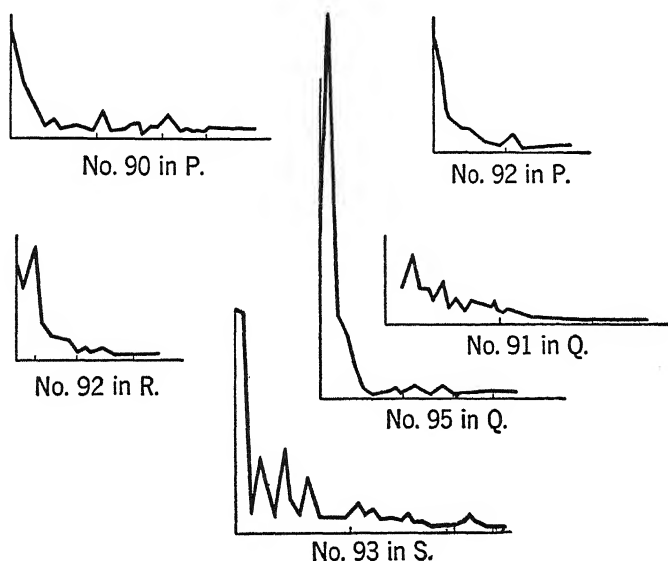
Figure 58. Sample Time-Curves Showing the Progress of Chicks Placed at A *in Escaping from Pens* P, Q, R, *and* S (*Figure 57*) S is a slightly more difficult maze (E. L. Thorndike, *op. cit.,* 1898.)

were white or albino rats, which have since been most frequently used because they are cheap and easily obtainable, prolific, fairly hardy, tame, and ready learners. Maze experiments have been performed, however, with many other creatures, including fish, turtles, squirrels, dogs, cats, sheep, and horses. The walls of the rat maze are usually about eight or ten inches high, covered with glass or with wire netting, and the passages and doors are from about three to six inches wide.
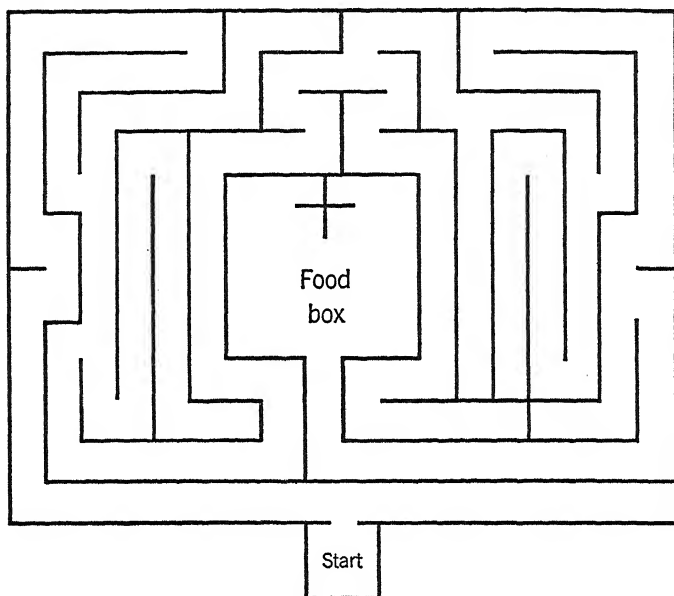
Figure 59. *Ground Plan of the Hampton Court Maze* The plan has been modified so that the path leads to the food box in the center instead of out of the maze. (P. Sandiford, *Educational Psychology*, New York, 1928. By permission of Longmans, Green and Company.)

When the rat is placed at the entrance and the door closed behind him, openings confront him at nearly every turn, some of which lead only to disappointing blind alleys at the end of which the rat may curl up and go to sleep. Or he may sniff about a bit and trot back again and thus make his blundering way along until at last by mere chance (and who could do it otherwise?) he finds the food box containing his bread and milk. From this he is ruthlessly snatched away by the determined experimenter, who sets him again at the gateway, and the whole thing has to be done over again. As this process is repeated, the number of blind alleys investigated becomes smaller and the time shorter, until after

a number of trials the rat is no sooner placed in front of the opening than his nose goes down, his tail waves triumphantly, and he scampers off making the turns without hesitation, covering the distance to the food box so rapidly that the eye has difficulty in following him. Figure
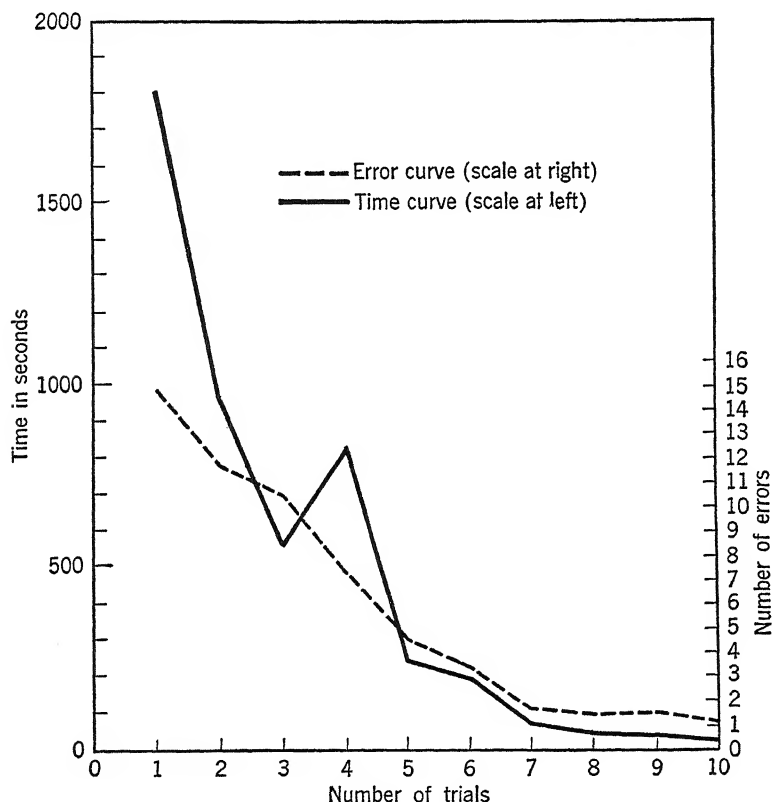
Figure 60. *Time and Error Records of White Rats* The graph shows the first ten trials in learning the Hampton Court maze shown in Figure 59. (P. Sandiford, *op. cit.* Drawn from table on page 90. By permission of Longmans, Green and Company.)

60 represents graphically the progress in "solving" the Hampton Court maze made by five rats as reported in tabular form. Their time for each trial has been averaged.

Another remarkable thing about Thorndike's monograph is that it presents the technique and results of the first *puzzle-box* experimentation, although Lloyd Morgan had earlier tried his dog's ingenuity by

having him retrieve a cane through a hedge; this blocked his progress when he took the cane in his mouth by the middle, instead of taking it by the handle and letting it trail along on the ground beside him. The use of the puzzle box in animal learning has had considerable vogue, and from it the process of trial-and-error learning has been written into the textbooks. For his experiments Thorndike used kittens as subjects, which he placed inside a lath cage with a spring door. The latch of the door was connected with various devices inside the cage, notably a loop, a pedal or platform, and a button or spool. The cat was motivated to get out by what Thorndike perhaps unfortunately called "utter hunger," which term aroused the sentimental for they thought the creatures were nearly starved to death; but it turned out to be no more than a fourteen-hour, overnight fast.

When put into the box the cat would show evident signs of discomfort and of an impulse to escape confinement. It tries to squeeze through

any opening; it claws and bites at the bars or wire; it thrusts its paws through any opening and claws at everything it reaches; it continues its efforts when it strikes anything loose and shaky; it may claw at things within the box. It does not pay very much attention to the food outside, but seems simply to strive instinctively to escape from confinement. . . . The cat that is clawing all over the box in her impulsive struggle will probably claw the string or loop or button so as to open the door.

Figure 61. Drawing of Box K Used by Thorndike in his Experiments with Cats (E. L. Thorndike, *op. cit.*, 1898. By permission of the publishers.)

K [Figure 61], was a box arranged so that three separate acts were required to open the door, which was held by two bolts at the top and two bars outside. One of the bolts was connected with a platform in the back center of the box so that depressing the platform raised the bolt. The other was raised by a string which ran up over a pulley near the corner of the box, and down to the floor, where it was fastened. Pulling on this string, either by clawing at it where it was running vertically from the last pulley to the floor, or by putting the paw out between the bars which covered the top of the box, and clawing the string down-

wards, would raise the bolt. If both bolts were raised and either bar was pushed up or down far enough to be out of the way, the cat could escape.[23]
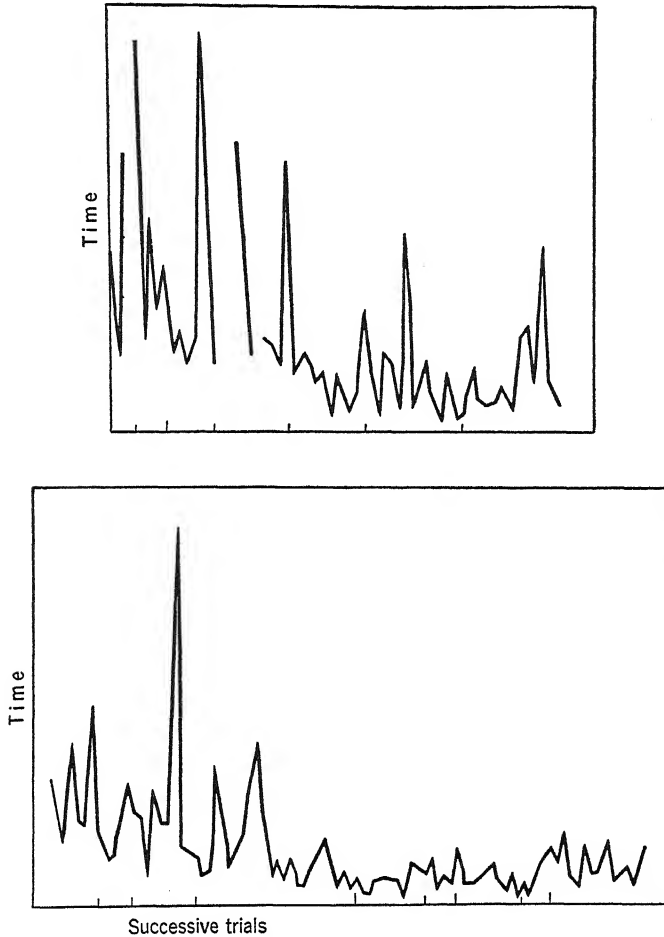
Figure 62. *Time-Curves Showing the Trial-and-Error Process by which Two Six-Months-Old Kittens Solved the Difficult Box* K (*Figure 61*) (E. L. Thorndike, *op. cit.*, 1898.)

This is one of the most complicated boxes; the efforts made by one kitten to solve its intricacies are charted by the time-curve shown in Figure 62. Other curves for a simpler box are shown in Figure 63.

[23] *Ibid.*

Both the maze-learning and puzzle-box experiments present the following characteristics: (1) The subject is motivated by hunger (and also probably by confinement) to seek food and escape; (2) he is frustrated in continuing this activity by the apparatus; (3) to the box and its interior appurtenances he responds in various ways; (4) the "correct" response, when made, is reinforced by food; and (5) in successive trials the number of incorrect responses is reduced more or less gradually until at last the act is performed with a minimum of unnecessary activity. The animal has learned to connect responses he was already capable of making with certain parts of the new situation. The rats could run through alleys and the cats could step on a platform or claw at a string before they were confronted with the possibility of doing several of these things in the experimental situations. These acts had to be done, however, in a particular way. How did they learn this way?

Figure 63. *Rapidly Falling Time-Curves of Two Kittens in Solving the Simpler Puzzle Box* C (E. L. Thorndike, *op. cit.*, 1898.)

It is easy to give a name instead of an answer. They learned by "trial-and-error," of course, or by "trial-and-success," or by the "selection of the successful variant"—three terms which refer to the same kind of behavior. But how? Thorndike originally suggested two possible explanations: (1) the resulting pleasure, and (2) a stamping-in, by repetitions of chance success.

"Resulting pleasure" as an explanation was, as we have seen, later formulated by Thorndike as the law of effect, with the "confirming reaction" or the reinforcement serving to make more probable the recurrence of the reinforced or rewarded response when the situation is repeated. Or, in other terminology, the experiments illustrate heterogeneous reinforcement, in which something the learner does is followed by a satisfying state of affairs, so that when the situation recurs there is a probability that the same response will be made. There is no necessity for any logical relationship between the response and the reward, nor for any reasoning about what response would be likely to succeed. This is true in most of these experiments and is quite striking in the case of the cat Thorndike trained to get out of the puzzle box by licking herself. Each time she licked herself, he opened the door that

led to the food. After a few repetitions, she would make a quick pass with her tongue and then start for the door. Such a solution of a problem is certainly by "accidental success," at least so far as the cat was concerned.

Thus to establish specific connections, that is, to get children to learn specific facts, to acquire specific responses to definite stimuli so many of which must be acquired in school, it is only necessary for them (not the teacher) repeatedly to make the desired responses to the appropriate situations and to reward them by calling out the confirming reaction. No matter how useless the information is, it will be learned, and this is the process. But learning will be more effective if the homogeneous type of reinforcement, as previously described, is allowed to operate and if logical patterns of relationships are also involved.

Derived Reinforcement—Expectancy. A third principle, *expectancy,* alluded to in the preceding chapter, has been put forward as an explanation of associative learning, in addition to those of substitution and effect already discussed. The principle of expectancy seems to be necessary to interpret cases of conditioning in which the subject does not substitute the same response, and in which there is no particular satisfying after-effect operating. The animal gets ready to eat, looks toward the door, or, in general, responds to the substitute stimulus by a set or attitude. The stimulus serves as a signal which, as a consequence of previous learning, leads him to expect a reward; or he may cower, jump aside, or run away, expecting punishment. Its effectiveness operates through derived reinforcement. The reinforcing agent is a token or symbol which the subject has previously learned as a signal for something to happen.

The expectancy response to tokens or symbols which are otherwise meaningless or useless is very familiar in human learning, the symbols ranging all the way from danger signals at railroad crossings, on the avoidance side, to money as a secondary reward. Children learn early what to expect when certain things happen. If what they expect is trouble, their responses are more or less unpredictable but tend to be of the same sort that is found when they are actually frustrated by the expected events themselves—fear, escape, and avoidance. If, on the other hand, events suggest a desirable outcome, their set is preparatory. In less emotional situations, much of what was said in regard to teaching children to perceive the significant has for its objective the development of their ability to notice the signs that indicate what may be expected—what should be done next.

Three kinds of conditioning or associative learning experiments have been discussed, each employing its own kind of reinforcement, and each explained by one or three principles. (See Table 13.)

TABLE **13** *Conditioning, Reinforcement, and Explanatory Principles*[24]

Type of Experiment	Reinforcement	Explanatory Principle
Classical conditioning	Homogeneous	Substitution
Instrumental reward and escape	Heterogeneous	Effect
Instrumental avoidance, secondary reward	Derived	Expectancy

Some supporters of one explanatory principle hold that one principle adequately accounts for all three types of conditioning. But at the present time it seems that each principle, through its own type of reinforcement, best explains the kind of conditioning it parallels in the table.

6. Guides to Effective Associative Learning

Reinforcement of Desired Attitudes. By way of summarizing the principles of associative learning, answers will be sought to two questions which are familiar to every teacher: (1) How can I make pupils want to learn? and (2) when they are willing enough to learn, how can I help them to learn what they are supposed to? The first is the problem of the reinforcement of desired attitudes, the second of desired responses, verbal or other.

To produce a conditioned response, whether it is an attitude or a verbalization or a motor coordination, it is necessary for the learner to be able to make the desired response to *some* stimulus. For salivation, or getting out of a puzzle box, it is easy to find a stimulus that will call out the desired response; but it is not always easy to find something in the school environment which calls out a favorable attitude response for each child. Sometimes the school routine is such that there is little in it to produce a favorable attitude in anybody. There are still many teachers who know nothing about the conditioning processes and succeed only in working it backwards to produce unfavorable attitudes.

[24] Adapted from Hilgard and Marquis, *op. cit.,* Table 22, p. 99.

They fall back on the rough-and-ready use of force and scolding, interlarded with threats of direful consequences to follow upon any neglect of the schoolroom tasks. "You'll do it because I tell you to do it"; "I don't want any such careless work as was handed in last time"; "If you don't do it now, you'll stay after school and do it; so make up your own mind"; "If you don't stop whispering and go to work you'll go marching right into the principal's office." How often have such pitiful threats of poorly trained, frazzle-nerved teachers reverberated through chalk-laden air! A complete reorganization of method and of the curriculum may be necessary if any but unfavorable attitudes are to be learned.

The key is to be found in the positive approach, in the satisfaction of the basic needs described in Chapter IV. Perhaps the school program may be set up in such a way as to satisfy a child's need for activity or for sensory satisfaction or for security or mastery. Of course, children know that failure is possible and undesirable, but it is not necessary to harp on it all the time. Adults work so as not to starve or freeze; but it is quite as true and much pleasanter to think that they work in order to have food and warmth. The experiments that have been performed are in harmony with good educational practice on this point. Overemphasizing errors, publicly or privately bawling a child out, as the phrase is, scolding about poor work done, casting aspersions on the abilities of the members of the class, and all the manifold impertinences of the profession do not act as stimuli to increase endeavor in the vast majority of cases. Instead, they serve as a distraction or frustration, block the flow of activity instead of directing it, and make the pupil discouraged or rebellious.

Reinforcement of the positive sort may frequently be provided by satisfying the need for effective effort or for social regard and recognition. Tasks that pupils can perform, some of which, at least, are satisfying in themselves, will provide rewards for pupils by their very completion. And boys and girls will exert themselves to the utmost to win the approbation of their schoolmates or the approval of a teacher, parent, or friend whom they admire (though they may not always be pleased to be held up before the class as bright and shining examples— embarrassment is too near, and the possible ridicule from one's mates for being a grind or teacher's pet). When the whole group can be commended, the effect is felt by its members. If the school program is so set up that parts of it provide for the satisfaction of pupil needs, the other parts will tend to produce the desired attitudes also, or at least, as the saying is, the pupil will "take them in his stride." But if the

program, through its prepotent stimuli, produces adverse attitudes, the child will be conditioned unfavorably toward its other aspects.

It takes a certain amount of ingenuity in some cases to discover the stimulus situations that will produce the desired favorable responses. Sometimes they are the team games, the shop work, the activities, the books and equipment. Sometimes they are the more elusive factors such as the kindliness or fairdealing or enthusiasm of certain teachers. However, it may be said that the reinforcement is most successful when the doing of the task itself is the chief reward sought.

Suggestions may be derived from the expectancy principle, with its arrangement for token rewards. The child will be apt to keep on going if the signs indicate that he is making progress. He does not have to receive a brass check that he can cash in on later, but he can properly be allowed to look at the mileposts to see that he is getting nearer his destination. This implies, first, that he should have a clear knowledge of immediate objectives. "What are we supposed to do?" "Does she want us to learn them by heart?" "How many have we got to know?" "Are we expected to do the experiment, or do we have to explain it?" Such common questions as these indicate the general uncertainty that follows poor assignments and a dubious grasp of the materials of instruction by the teacher.

Furthermore, the learner's progress toward the objective can and should be measured. A knowledge of results and of the amount of improvement made is an important factor not only in motivation but in more efficient learning as well. This is one of the most satisfactory motivating principles, pointed out by Rousseau and reiterated by many writers since. Self-instructional materials and standardized tests and scales are making this much more feasible than it has ever been before. Without them, one is training a track squad without a measuring tape or a stopwatch.

In order that the pupil may not make the tokens, that is, the symbolic rewards, such as praise of the teacher and records of progress, his sole objective, which it is not desirable that he do, their connection with the real satisfactions, the more ultimate goals, should be clarified. Probably the best rule for effective motivation is the following: Enable the pupil to recognize the end to which his rewarded efforts are but means. Chemistry is important for the boy who plans to study medicine, Spanish for a position in South America, geography so that we can know about the shrinking world in which we live or trace the auto routes and air lines. Of course, some subjects fit none too well into this plan, and for these the fiction of formal discipline has been implanted. However,

instead of hoping for a general power to be developed in the children, the teacher may often develop desired knowledge and skills that are satisfying to the pupils and serve as a more proximate objective than the ultimate ones of vocational success and the good life.

If it is shown that a knowledge of syntax is actually a help to more rapid and correct translation instead of just an additional instrument of torture, students will drill themselves on grammar. Failing this, and falling back on the docile nature of the child, the teacher may point to the intermediate goal—the requirement of the course for graduation, the desire of the child to be graduated, and his ability to "pass" if he tries.

The reason that the usual marking system has been so long in vogue is probably that it applies, though imperfectly, the principles here enunciated. A good mark is a reward, a poor one a reproof. The mark shows or should show the pupil whether he is attaining his objective (doing what the teacher wants) and the progress of his improvement. A good mark means teacher and parent approval, one of the ends to which the study of the subject is the means. Like so many things, this is not bad in itself; but overemphasis makes it bad. Good marks are extrinsic; the ability to use the knowledge and skills developed by a mastery of the subject is the intrinsic worth to be sought. A desire for a good mark in arithmetic or German should not obscure the fact that one studies these subjects not to get good marks, but to be able to figure accounts correctly or to use the German language as a means of expression or to obtain information or literary enjoyment.

Reinforcement of Desired Responses. The second question is, "How can pupils be helped to learn the specific things they are supposed to learn?" Here, again, the processes of contiguous experiencing, substitution, and reinforcement can and must be employed. Their operation in the several school activities will be discussed in a later chapter. But whether the item to be learned is a swimming stroke, a basketball play, a verb form or meaning, a poem, or a cause-effect relationship in history, the pupil must go through the following routine:

1. He must perceive the stimulus to which response is to be made (substitute stimulus). This was discussed in detail in Chapter X.

2. He must be induced by some cue (original stimulus) to make the desired response.

3. He must be "rewarded" when he makes it.

There has been so much confusion about "rewards and punishments" in school that the third point should perhaps be elaborated a little further. It is easy for the teacher to say "That's **right, good, very good, correct,**"

or some such word or phrase to confirm or reinforce the right response. Experiments have shown that increasing the intensity of the reward by presenting pieces of candy or money, or giving enthusiastic praise for each correct response, is not only not particularly helpful but may serve as a distraction. Furthermore, it is not necessary to reward each of a series of responses equally by saying "Right" every time; the reward spreads to neighboring responses, and is accepted as applying to a series.

The effect of "punishment," that is, of saying "wrong," or equivalent words or phrases, does not have an equal opposite effect in eliminating the wrong responses. Sometimes it even strengthens them. In general, however, punishment blocks a line of activity so that the learner tries some other response which may be equally bad, unless, of course, there are but two possible choices. A teacher sometimes implies that pupils are culpable when he says, "You're just guessing"; but he has actually forced the pupils into just this activity. It is probable that, in associative learning, complete neglect of a wrong response is often better than punishment, providing the situation is so set up that the pupil can make the correct response which can then be rewarded.

4. He must repeat the response with the cue present, experiencing the word and its meaning, or whatever the item is, contiguously. He makes the association by seeing the two together often enough so that one of the parts alone will later produce the desired response.

5. He must make the response without the cue, that is, when the item alone is presented—*the method of recall.*

The cue may be the directions of the teacher, or it may be what is in the book that is being learned. If one only reads and re-reads, he is learning to respond with the page in front of him. If he is to be able to make the response without the page in front of him, it is necessary to practice doing this, for one learns to do what one does. The method of recall is an important stage in the process of learning and valuable even when recall is not perfect and one needs occasional recourse to the book.

But ability to respond correctly to the substitute stimulus alone immediately after it has appeared contiguously with the cue or original stimulus is no guarantee that the response can be made to the substitute stimulus alone the next day or the next week. The probability is greater that the item learned will be remembered if it is repeated a few times immediately. Many experiments have been performed which reveal the superiority of *distributed repetitions* over massed learning. And there is likewise ample evidence that the learning of a section of related parts, called grouping or *whole learning,* is a valuable supplement to the piecemeal learning of isolated parts. This latter point is illustrated

by the repetition of foreign words and word-forms in context, of the whole poem or stanzas of a poem instead of separate lines one at a time, and so on. When one gets the general idea of a thing, the parts that fit into the pattern are more easily learned. Overlearning, distributed repetitions, and grouping are important aids to retention and are discussed in Chapter XIII.

These guides to effective associative learning have been presented from the point of view of the teacher who wishes to help pupils to learn, but they are not likely to employ them without help. The teacher must teach them how to study, and this can be done effectively not merely by telling them how, but also by giving them practice in using effective methods. So the class period should be used not only for teaching the pupils what they should know, but, what is more important, and often neglected, for teaching them how they can best obtain knowledge for themselves.

In Summary

When an individual who can make a certain response to one stimulus learns to make it to another stimulus, the process is called association or conditioning. The British associationists explored the process as it relates to ideas and developed the principle of contiguity (temporal and spatial): When two events occur together in a person's experience, if one of them is later thought of, the second will be likely to be thought of too. They also developed the principles of frequency, recency, and intensity as factors influencing the probability of appearance of the second idea rather than some other with which the first idea may also have been associated. These and other conditions, such as those that produce responses that are systematic and sequential, and usual and unusual, have been studied in the many forms of the association experiment.

The associative shifting of Thorndike and the conditioning experimentation of Pavlov showed that the same basic principles of contiguity apply also to behavioral responses, and to those of both men and animals: When two stimuli occur together in one's experience, if the individual responds to both of them in the way he previously responded to one of them, he will respond to the other, when it is presented separately, in the same way. Supplementary principles were likewise developed which were revealed as factors and conditions influencing the probability of appearance of the second or substitute response. These include the basic three: frequency, appearing as exercise or repetition; and also belongingness, polarity, disuse, fatigue; and, most important of all, effect.

The principle of effect, or reinforcement of the response made, has been revealed in countless experiments. The response, as a rule, continues to be made when the stimulus appears only if the response is followed closely by a satisfying state of affairs, by one that provides for some need, or by the attainment of the goal in pursuit of which the response is made, although these are not mutually exclusive.

Learning is basically the process of acquiring new responses to perceived situations, whether the responses are verbal or more broadly behavioral, whether they are ideas, skills, or attitudes. The acquisition of knowledge—i.e., of the ability to make the verbal responses upon which the culture is in agreement to verbal materials, whether they are words or numbers or whether spoken or written—has long been the one to which most of the school time has been devoted (Chapter XIV). The associative (or conditioning) process is the one by means of which this knowledge is acquired, and its basic principles of contiguity and reinforcement, and the others as well, are operative not only here but also in other learning areas (Part 5).

Questions

1. What differences do you see between association and conditioning?
2. Diagram the process of conditioning (*a*) a dog to bark when you whistle; (*b*) a child to keep away from the gas stove; (*c*) a child to get over his fear of dogs; (*d*) a high-school boy or girl to like history (or any other subject). See if you can make this theory work by trying some such conditioning on some pet or child. Report results.
3. Would it be possible to be conditioned to do something one couldn't do before? What bearing might the terms "substitute stimulus" and "substitute response" have here?
4. Define: contiguity, conditioning, substitute stimulus, original stimulus, homogeneous reinforcement, expectancy, part-whole learning, massed learning, recall, overlearning.
5. Show how the principle of contiguity operates in classical conditioning, maze, and puzzle-box learning; the cue; reinforcement.
6. Indicate ways in which more attention can be given to the acquisition of vocabulary in the subject or grade you plan to teach.
7. Compare the advantages of formal learning of the meanings of lists of words and learning their meanings in context.
8. How may pupils be motivated to study?
9. Following the suggestions in this chapter, how might the teacher teach (rather than tell) the pupils how to study parts of a subject with which you are familiar?

10. In what ways can the desire to know be encouraged?

Readings

The contributions of the British Associationists may be further investigated in the following:

Rand, B. *The Classical Psychologists*. Boston: Houghton Mifflin, 1912.
Extensive quotations and commentary.
Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.
Chapter V includes short quotations relating chiefly to the laws of association.
Warren, H. C. *A History of Association Psychology*. New York: Scribner, 1921.
A scholarly account of the development of psychology in the hands of the philosophers.

Experimental work in association and conditioning is reported in the following:

Garrett, H. E. *Great Experiments in Psychology*. New York: Century, 1941.
Chapter V reports many of the more interesting details of the Pavlovian experimentation, and Chapter VII of the Thorndikian.
Hilgard, E. R., and D. G. Marquis. *Conditioning and Learning*. New York: Appleton-Century, 1940.
A detailed analysis of conditioning.
McGeoch, J. A. *The Psychology of Human Learning*. New York: Longmans, Green, 1942.
A scholarly volume for advanced students. See especially Chapters I, II, IV, VII, XII, XIII, XIV.
National Society for the Study of Education, Forty-first Yearbook, Part II. *The Psychology of Learning*. Bloomington (Ill.): Public School Publishing Company, 1942.
Chapters I and IV by Guthrie and Gates respectively give the points of view of conditioning and connectionism.
Pavlov, I. P. *Conditioned Reflexes*. London: Oxford University Press, 1927. Also *Lectures on Conditioned Reflexes*. New York: International Publishers, 1928.
The original reports on the classical conditioning experimentation.
Razran, G. H. S. "Conditioned Responses in Children: A Behavioral and Quantitative Critical Review of Experimental Studies." *Archives of Psychology*, No. 148, April, 1933.
Reports chiefly from the Russian laboratories.

Thorndike, E. L. *Human Learning*. New York: Century, 1931. Also *The Fundamentals of Learning*. New York: Teachers College, Columbia University, 1932.

Experimentation on the laws of learning is described in these two volumes, the former being in the form of lectures, and the latter the more detailed report.

Thorndike, E. L. *The Psychology of Wants, Interests, and Attitudes.* New York: Appleton-Century, 1935.

Experiments in the fields of interests, rewards, and punishments.

Thorndike, E. L. *Selected Writings from a Connectionist's Psychology.* New York: Appleton-Century-Crofts, 1949.

Chapters I–VII report studies of the effects of different variables on learning.

Tolman, E. C. *Purposive Behavior in Animals and Men.* New York: Appleton-Century, 1932.

Elaboration of the goal-directed interpretation.

Young, P. T. *Motivation of Behavior*. New York: Wiley, 1936.

A detailed treatment of motivation.

General readings on different phases of the problem of associative learning may be found in the following:

Guthrie, E. R. *The Psychology of Learning*. New York: Harper, 1935.

Chapter III, "The Conditioned Response," is the key to Guthrie's explanation of learning.

Powers, F. F., T. R. McConnell, and others. *Psychology in Everyday Living*. Boston: Heath, 1938.

Especially Chapters XIII, XIV, and XVI.

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

Pages 378–392 include readings on association theories, the conditioned reflex, Pavlov's experiments, and the laws of readiness, exercise, and effect, the latter by their formulator; pp. 407–413 present Tolman's purposive view of learning.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.

Chapters V and VI contain selections from the writings of the British associationists, Thorndike, Pavlov, Guthrie, James, and others; on pp. 159–162 Thorndike states succinctly his view on "how we learn."

Thinking and Problem-Solving

Learning to Think. Sometimes a parent is heard to remark, "I don't care so much what my son learns at school. He'll probably forget most of it anyway. What I want is to have him learn to think, to use his mind." Such a remark is in harmony with the aspersions sometimes cast on "mere facts," or on the students who memorize facts for examinations but "don't know what it is all about." Throughout the ages, to attain understanding and wisdom has been a goal to be sought, while in practical affairs, in business, or politics the person is needed who has ideas, who can think up ways to meet the problem, say, of a reduced market demand for goods or of conflicting claims. The school curriculum provides countless opportunities for thinking, needed not only in the subjects and activities themselves, but also in life problems later on. However, it is not enough merely to "take" the subjects, or even to learn them. Thinking must take place. The teacher needs to know what the thought processes are, and how they may be developed.

It should perhaps be added that thinking is not only a useful, but also a dangerous, activity. Confronted by those who place reliance on primitive, magical ways of thought, the use of narrow concepts, stereotype judgments, traditional prejudice, and the like, one is likely to become pessimistic or cynical. Or, he may set out to loose some of these chains which fetter the mind of man and make him a slave not only to political tyranny but to lesser demagoguery and to quackery as well. If he chooses the latter course, he is likely to find himself attacked by those who profit directly or indirectly from human stupidity, sometimes the "best people," who will strike back violently and ruthlessly against those who they think are undermining their positions of power, or destroying their security. Thinking must go beyond the clarification of error. It must discover ways in which error may be corrected.

1. PROBLEMS

What Is a Problem? The processes by which knowledge is acquired have been discussed in the last chapter. We now come to a consideration of those situations in which the individual must respond when, so far as he knows, there is no ready-made response to be learned and certainly no dependable, blind tropism or reflex to handle the adjustment automatically. The answer is not in the back of the book, but it must be discovered somehow. The question may be put in this way: What do you do when you don't know what to do? You are faced with a problem when such a situation presents itself, when there is no preformed instinctive or habitual mode of reacting satisfactorily.

It must be admitted at the outset that the distinction between associative learning and rational learning or problem-solving is not so sharp as one might suppose. Both may appear together in the same situation. If a child is reading and comes to an unfamiliar word, he is faced with a problem; though when he is told the meaning, he acquires it associatively. The animal that is locked in a puzzle box has the problem of getting out, whether it is said that he solves the problem or that he is conditioned by the reinforcement of the successful response. A problem appears whenever a living creature has a goal but doesn't know how to reach it. Or, stating it another way, a problem is viewed as appearing when there is an interruption in a course of activity, or when the satisfaction of a need or desire is blocked. John Dewey employed the term "felt difficulty" to designate a problem situation which is recognized as such by the individual.[1]

Why Learn to Solve Problems? The first answer to this question is in terms of stark *necessity* for the satisfaction of human needs. The automatic reflexes and habits can perhaps regulate the physiological processes and routine behavior, but their inadequacy in the face of a novel situation needs no demonstration. A teacher interviewed by a prospective employer, meeting her first class, or confronted by a disciplinary situation or an offer of marriage needs more than the autonomic nervous system and an assortment of reflex arcs to assure her of a successful outcome. Such questions as the following are illustrative of the host of problems which at one age or another have a very practical significance, and which many people have been unable to solve satisfactorily:

Which high-school course shall I take—the academic or the commercial? Shall I go to college or to business school?

[1] John Dewey, *How We Think,* New York: Heath, 1933.

What shall I think about religion and the church?

What should be my college major?

How can I secure a job?

How much should I spend for clothes, for food, for recreation?

What magazines shall I read?

How much time shall I devote to the theater? to music?

How much life insurance shall I carry?

Shall I buy or rent a house?

How can I find out more about the French cathedrals?

How can I be successful in my work?

Couldn't I think of some device that would work better than the one I am using?

Can anything be done to make the delinquents want to be law-abiding, or to make the foreign-born children feel at home?

Shall I leave my present job to accept this new offer?

The list could be extended indefinitely to include the many problems large and small which, through life's course of threescore years and ten, may roil the troubled waters of the stream of consciousness and temporarily dam or divert the activity stream. Without the ability to meet problems adequately, satisfactory adjustment and normal growth are impossible. This is the sterner side.

The second answer to the question, why learn to solve problems, is to be found in the sheer *enjoyment* it affords. As we have shown earlier, if the obstruction offers no insuperable difficulties, its removal is less a task than a delight. Not only do the many kinds of puzzles, crossword and others, testify to the fun to be derived from mental work, but so do the whole gamut of games from football to chess; and this same satisfaction is to be found wherever difficulties are being met and problems solved.

Seeing Problems. An act of thought is always preceded by some difficulty, be it real or imagined. A difficulty, in the terminology of an earlier chapter, means a desire that has been frustrated in one way or another, one which discloses no ready-made path to its realization. The development of various skills and habits reduces the number and seriousness of the obstacles encountered in the ordinary walks of life. Indeed, so effective is that process in a well-regulated social order that many regard a real difficulty as an affront, something that has no right to be, and are totally incapable of coping with it adequately. They seem to expect their path to be smoothed before them so that they can go through life as the legendary Caliph went to Mecca, with slaves to unroll an endless velvet carpet before them.

Others live a hand-to-mouth existence, taking the world as they find it, and try to make the best of it. They have the finest little city in the world, with the best system of parks and municipal waterworks. The schools and churches, the banks and factories, are just all right, and who says they aren't! Children are brought up to do what they are told at home and at school, the customary becomes the correct, and no one knows or imagines anything different! The enormous apathy of people, their smug satisfaction and complete indifference, is often as great an enemy to their welfare as open opposition.

Still others see that the city is smoky and ugly, the politics corrupt, the churches fulfilling only a part of their mission, and the schools unhealthy for the bodies and minds of the children. They are not critical in the unpleasant sense, but they recognize that here are conditions which can and should be corrected.

These illustrations from the wider life of the citizen in which the children in the schools today will soon participate, effectively or otherwise, may be supplemented by others more directly relating to the work of the school. Here, too, the complacent attitude is opposed by those who see in tardiness, truancy, and delinquency the problem of maladjustment; and who see in the failures and elimination of pupils, problems of classification, of teaching method, and curriculum construction.

In short, then, there are two extremes. At the one extreme are those who are satisfied with their habitual responses, who feel that they are getting along as well as can be expected, and are content to let sleeping dogs lie. At the other extreme are those who see in the life about them conditions which are far removed from what they might be, who are not contented with horse-drawn vehicles, or human suffering, or social injustice, for example, and recognize that something can be done about them if they are viewed as problems that might yield a solution if attacked in the right way. But, for all, there are the manifold problems of everyday life which are met somehow—often irrationally or unwisely.

2. Finding the Solution

The Frustration Response. We have already considered in some detail (Chapters V and VI) the various kinds of frustration responses to problem situations—emotional disturbances, irrational and imaginary escapes, displaced aggressions, and the rest—in total, a sad commentary on the nature of *homo sapiens* with his frequently extolled mental superiority over the brute. These ways of responding we may profitably learn

to recognize in others (and in ourselves) and deplore, and perhaps help in one way or another to correct them. But they are not solutions.

Solution by Another—Authority. Naturally, it is impossible and unnecessary for each person to solve every problem that comes his way. Many of his difficulties are the same in essence as those which others have met and mastered, so he may well profit from their labor. The school curriculum, viewed in one way, consists of systematically arranged series of solutions, with the teacher present to explain just how they work. Of course, they are pretty well condensed—"cut and dried" is a phrase commonly employed. A few problems are therefore left in, to make things more interesting.

But many problems, at least in the way they present themselves, are not in the book, or at least their solutions are not presented in a way that seems to fit the particular difficulty the individual finds himself in. To meet this situation, a number of professional people are ready to explain how the solutions work, and so solve his problems for him. These are doctors, lawyers, teachers, ministers, priests, and others. Some people are very enthusiastic about this professional assistance. They "swear by Dr. X," or they seek out a religious counselor whom they can "lean on." Valuable as such assistance is, it can be overdone. A teacher expects pupils to do some of the work themselves and not rely on him to do their "examples" for them. And psychological counselors aim to help people to work out their own difficulties.

But when a person is confronted by a real difficulty and realizes that he can't get out of it by doing "the first thing that pops into his head," it is natural for him to look around for someone who knows the answers. He will turn to authority. Ask someone who knows. Look it up in a book. Follow the party line. You can't go wrong—or perhaps you can.

The ways of authority are interesting to know. For example, in all the world's religions, when some great prophet has appeared, his word is taken as the guide of life, his teachings have been incorporated in a "Book," and a self-perpetuating group has formed an "Organization," a priesthood perhaps, to interpret them to the multitude. Similarly, minor prophets have broken away, forming denominations and sects, themselves becoming lesser authorities but still under the sway of the greater authoritarian influence. In politics, the same is true: the book is a constitution, a charter, or treatise, and the political party is the organization. We find something quite similar in the different schools of painting, of philosophy, and of psychology.

The Man, the Book, and the Organization have been equally potent

in the field of education. Aristotle, Thomas Aquinas, Locke, Rousseau, Herbart, Pestalozzi, Froebel, Montessori, Dewey, and many others have all been educationally sainted; their writings have been passed about amongst their followers, and societies, normal schools, colleges, and universities have been inspired to continue the indoctrination—often to the real advantage of all concerned.

There are three grave dangers, however, that need only be mentioned. One is that the prophet may be wrong. There is usually an opposition party which may not look as black to the unprejudiced observer as it does to those within the cult, which suggests the possibility of error that might well be inquired into. Secondly, the teachings may have been wise in their time but may have become obsolete with changing social and economic conditions and the remarkable advance of human knowledge on all fronts. Thirdly, the disciple may interpret the principles and apply them in a way which would sadden the prophet. A man's worst enemies are oftentimes his most devoted followers.

Unless the leader's experience has been very unusual, the same data are open to the inquirer today as were available when the Book was written and so can be subjected to experimental investigation. Acceptance should therefore be tentative, until the laboratory and actual practice have justified greater confidence. A blind adherence to authoritarian indoctrination may solve the difficulty, or it may produce malpractice and turn out a botched job.

Scientific Approaches—the Anecdote. If the way solutions are found is to be understood, the process itself must be investigated. And one way to investigate such processes is to study them as they appear in a less complicated form in the behavior of animals. In the biological sciences many studies have been made of lower forms of life from which inferences may be drawn concerning the nature of man, and psychology is no exception. Indeed, from the earliest times men have conjectured about the thought life of animals, and told stories of the wisdom of domestic and savage beasts. Aristotle, in his amazing and none the less amusing *Historia Animalium*, inserts—along with his description of noses and gill slits, his inductive evidence for an auditory or a gustatory sense, and all the rest—many an observation about animal motives and passions, intelligence and sagacity. In more recent times, when people began again to follow Aristotle's methods rather than his doctrines, the observation and report of animal behavior came into vogue. Unfortunately, they also were guilty of his chief error of technique, namely, the inclusion of unchecked and hence untrustworthy reports.

And what made it worse was a severe outbreak of special pleading. Philosophers and theologians had glorified man for his exclusive possession of a rational mind and an immortal soul, setting him apart from the mechanical, instinct-driven beasts. Then came Darwin's heaven-shaking *Origin of Species* (1859), as a consequence of which earnest observers sought to minimize the differences and demonstrate a continuous series from animal to man by showing how animals are at least almost human. Stories of the marvelous intelligence of cats and dogs, of bees and spiders, of horses and elephants multiplied enormously.[2] Many of these anecdotes were no doubt authentic, but many more were recounted by persons ignorant of the nature of the animal they described and of his past experiences. And often the stories came by word of mouth with too long an interval between the phenomenon described and a written record, so that the story had a tendency to grow, each person aiming to make the pet animal of his story appear as remarkable as possible. Perhaps the following quotation will illustrate the defects as well as the lure of the *anecdotal method*:

Miss Knight, in her 'Autobiography' gives an account of an occurrence which came under her knowledge. An old lady of some property, who died in Ireland, had a nephew a lawyer, who had made her will, and to whom she had bequeathed all that she possessed. The old woman had a favorite cat, which was constantly with her, and even remained close by her coffin after her death. When the funeral was over, the will was read and on the door being opened at the conclusion of the ceremony, the cat sprang into the room, rushed at the lawyer and seized him by the throat with such force that she was with difficulty prevented from strangling him. About eighteen months after this scene the man died, and was moved by remorse to confess on his deathbed that he had murdered his aunt to get possession of her money.[3]

The scientific study of the thought processes was in about this state of affairs when Thorndike began his experiments, described in the preceding chapter. His monograph marks an epoch in the history of psychology. It begins with a spirited attack on the animal anecdotes which, he insisted, are not psychology but eulogy.

Thousands of cats [he wrote] on thousands of occasions sit helplessly yowling, and no one takes thought of it or writes to his friend, the

[2] See George J. Romanes, *Animal Intelligence*, New York: Appleton, 1883; and *Mental Evolution in Animals*, 1884.

[3] J. S. Watson, *The Reasoning Power in Animals*, London: Reeve and Co., 1867, pp. 252–253.

professor; but let one cat claw at the knob of a door supposedly as a signal to be let out, and straightway this cat becomes the representative of the cat mind in all the books.[4]

As a consequence of his experiments and the work on conditioning, the processes involved in associative learning were elaborated, with emphasis on the simple situation in which one stimulus is to be responded to, and the response reinforced in various ways. But still no one was very clear about how animals—or people—solved problems.

Solution by Chance Success. In the maze and puzzle-box experiments the animals seemed to arrive at their solutions by what looked like a chance process. Take the kitten in the puzzle box, for instance. If someone opens the door and lets him out, his problem is solved, though he hasn't solved it. If by chance he steps on the pedal that opens the door, his problem is solved, but in a fashion equally unintelligible to him. Next time he may step on the pedal and get out. But, if he were able to tell how he did it, he might say, "You just step on that thing over in the corner and the door opens, but blessed if I see why!" He has solved a problem, true enough. He might even be said to have discovered a regularity in nature. But he does not understand the situation; so, if it is changed ever so little, say by the introduction of a string or a lever to replace the pedal, he is again baffled and has to start all over again. If he were human his beautiful faith in the goodness of the universe would be destroyed, and he might decide that bad luck or fate was pursuing him and develop paranoia!

This somewhat fanciful illustration suggests that, in the real solution of a problem, other things in the situation need to be taken into account besides the stimulus, narrowly viewed, and the rewarded response. The chance solution implies that something that is done was followed by success. One fools around, manipulating this or that lever, or stick, or piece of a puzzle, or idea, trying it out to see what will happen. As we shall see, such solutions are not always completely chance affairs. If one is putting a puzzle picture together, he doesn't try out the chairs in the room or even the baby's blocks! The situation is delimited. But, within that delimitation, most anything may be given a trial to see if it works.

Solution by the Learner Himself. While many problems may be solved in the mechanical way described above, they hardly involve the processes that can be referred to as thinking or problem-solving. The learner cannot sit idly by waiting for somebody or something to turn

[4] E. L. Thorndike, *The Psychological Review,* vol. 2, No. 8 (June, 1898), p. 4.

up. He must do something. If he does, he may obtain a solution—and he may not.

3. STRUCTURING THE SITUATION

Overview of Related Parts. In the alley-maze and the puzzle-box situations, even a transcendent intellect would have to resort to chance trials at first, since there is no way in which he can possibly get an idea of the whole set-up. In the case of human problems, some kind of diagram, map, plan, or model is often helpful, since it reveals the various aspects of the total situation and their relationships. Sometimes we say we want to "get the whole picture," meaning that we want to see the various parts of the problem in relation to one another.

Different kinds of experimental situations have been devised which give the subject an overview of related parts. Among these are the elevated-pathway mazes and the detour experiments of Köhler and others.

Detour. A very simple form of the detour experiment is that described by Köhler in which a fence keeps the subject from the food (Figure 64).
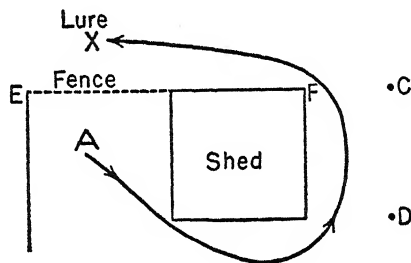
Köhler pointed out that this presents no difficulty for a dog or a little girl a year and three months old; but a hen finds the indirect route only by chance after poking her head through the same holes in the fence times innumerable. She first zigzags about uncertainly, "and, if one of these parts of the route leads to a favorable place,

Figure 64. Simple Detour Ground plan showing path followed by a dog and a child from point *A* to lure *X*. A hen zigzags back and forth in front of the fence, and finds the solution only after reaching *F* by chance. (W. Köhler, *The Mentality of Apes*, New York: Harcourt, 1926. By permission of Harcourt, Brace and Company.)

suddenly rushes along the curve in one single, unbroken run . . . the one type of behavior succeeding the other so abruptly, that no one could mistake the difference in the two kinds of movements. . . . The dog stops, then suddenly turns completely around (180°), the child looks about, suddenly its face lights up, and so forth." They get the idea![5]

It is to be noted that for Thorndike's Box K (Figure 62), the learning curve shows a large number of errors and only a gradual learning of

[5] W. Köhler, *The Mentality of Apes*, New York: Harcourt, 1926.

the correct method of opening the door. But for simpler cages, the solution, when found, was employed at once thereafter, as shown by the sudden drop of the curves (Figure 58). Koffka called attention to the sudden drops in the puzzle-box curves which Thorndike passed over, and contended that the sudden discovery of the solution which they show cannot be explained by the trial-and-error theory.[6]

The pioneer detour experiments, giving an overview of related parts, were those performed by Wolfgang Köhler on chimpanzees which he had been observing at Teneriffe, one of the Canary Islands.[7] Especial interest attached to his work because the animals he studied belong to the species of anthropoid or manlike apes, the highest of the vertebrates next to man, the animals in which not only the beginning of sagacity but something akin to a rational mind should be found if it is to be found at all.

Slightly more complicated detours were placed before the chimpanzees, situations adapted to their physical structure, and always such that if the animal has had the proper previous experience, and if he is bright enough, he can get them right the first time. In other words, the blind complications of the maze and the puzzle box are avoided. A banana, the most successful lure for the chimpanzee, is suspended in the air, and the animals jump for it, rear tipsy piles of boxes under it, or poke it down with a pole. One particularly athletic ape balances a pole upright, quickly climbs it, grabs the fruit, and then jumps to the ground as the pole falls. In another series of experiments the lure is placed just outside the bars of the chimpanzee's cage. He goes to the back of the cage and procures a stick with which he pokes at the banana. Perhaps the stick is too short and so he pushes it forward with another so he at least succeeds in wiggling the fruit, a "good error," for he has at least established communication! Another time he gets a stick long enough to draw the lure toward him so that he can reach between the bars and grab it.

The star performance was an exhibition of "tool-making." By chance or design the ends of two bamboo poles are fitted together. Of a sudden this becomes a single pole which can be used to hook the banana toward him, and thereafter the ape joins such poles together, like a fishing rod, with considerable facility, even gnawing around the end of one if it is too large to fit into the socket of the other segment.

Restriction of the Field. These experiments illustrate a number of important aspects of problem-solving which need to be considered in

[6] K. Koffka,, *The Growth of the Mind,* New York: Harcourt, 1924, p. 182.
[7] Köhler, *ibid.*

some detail. It is clear that the chimpanzees did not get the bananas by "scrabbling" all over the inclosure. They might be said to have concentrated on one part of the field and to have left out of consideration other aspects of it which, under other circumstances, might have engaged their attention. The banana, stick, and box were, in a sense, marked off from the rest of their environment. It is as if a fence were built inclosing the part of the field within which the individual was operating at the time, or as if on a chart or map or diagram a line were drawn inclosing certain parts. This is *closure*, the process of creating actually or figuratively an inclosed figure, as we noted in the chapter on perception.

Such a restriction of the field has definite advantages. In other situations, it can be called a "delimitation of the problem." It implies a recognition that certain matters are related and others not, and encourages a detailed consideration of those which are, free from the interference of distracting and irrelevant stimuli.

There are, however, certain dangers of premature closure, since the solution may lie outside the boundary line that has been drawn. Thus the problem is oversimplified and a solution may not be found. For example, if the stick needed by the chimpanzee happened to be off at the other end of the yard, unless he is able to include it "mentally," he would be unable to get it to knock down the banana. Another illustration is to be found in Figure 65. The problem is to draw four straight lines through the nine dots without overlapping and without taking the pencil off the paper. The form of the figure is such that one tends to view it like a square, the outside dots making the boundary. If this is done, the problem is insoluble, for one must go outside this boundary for a solution as shown in Figure 66, page 458.
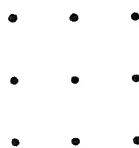
Figure 65. Closure Problem

Thus an approximate regional demarcation may result in oversimplification since it may keep an individual within the framework of a narrower problem. He may say it is "nothing but" so and so, or "mere" something else. The solution he finds, if he finds one, for getting a good mark, handling a disciplinary situation, getting elected, or whatever it may be, may be no satisfactory solution at all, since the real solution involves activities he hadn't even considered, that lay outside the field.

Locus of Difficulty. Within the restricted field, the subject may discover a certain aspect of the situation that seems to him to be what

is responsible for the difficulty. "The trouble is right here," he says, or "if I could only see my way clear at this point, the rest would come easily." "Yes, that's the catch," a friend might remark. This was illustrated in an experiment carried on some years ago which reveals many of the characteristics of human problem-solving.[8] The experimenter used ordinary toy puzzles, most of them of wire units which come apart when manipulated correctly. He studied what the different subjects did when confronted with these situations and found that random manipulation played no small part in the attainment of success.

Figure 66. Solution Avoiding Premature Closure

However, interrelationships were apprehended, though with different degrees of clarity ranging from a vague feeling of familiarity when a variation recurred, to a clearly imaged, describable or usable understanding. Analysis included the different parts of the puzzle and the necessary sequence of movements required to solve it.

This might be a partial analysis of which the subject sighted the *locus* of the difficulty, as if he said, "Now the trouble is right here," thus eliminating the random movement of other parts of the puzzle and causing a quick drop in the curve; or it might be a more detailed analysis of the successive steps.

Sometimes manipulations brought an accidental success which was not always noticed [compare the chimpanzee's fitting the two sticks together], and sometimes manipulation followed a careful visual analysis of the situation. Again, the analysis and the motor variation may be simultaneous and yet clearly distinguishable, a flash of insight and a motor impulse.

Various assumptions derived from more or less careful analysis were tried out. The subjects differed in their *flexibility,* some clinging to futile ones like grim death and others forsaking them sometimes without evidence of their futility.

4. RESTRUCTURING THE SITUATION

Insight. When one has the situation as a whole or in part under his purview, the elements sometimes quite suddenly take on a different

[8] H. A. Ruger, "The Psychology of Efficiency," *Archives of Psychology*, No. 15, 1910; and Reprint No. 5, New York: Teachers College, Columbia University, 1926.

appearance. The figure that at first stood out may disappear and another figure emerge from the ground as in the ambiguous drawings discussed in the chapter on perception. Similarly, the dog, when he turns away from the fence and runs around the shed to get the meat, perceives the situation in a different way. It may be said to be "restructured."

Such a "restructuring" has been made much of by the gestalt psychologists. The word "gestalt" emphasizes the importance of the nature of the stimulus situation as it is perceived, or the relatedness of the parts of a whole, whatever it may be. This relatedness as it is represented to the individual is its structure, and when the relation of the parts changes, it is restructured. The restructuration may or may not provide a solution, but there can hardly be a solution without it.

What seems to happen is that things are suddenly perceived in a different pattern. A loosely made box or crate may be used as something to climb on, but it may suddenly be perceived as something from which a slat may be torn off to be used to knock down or drag in the lure. The figure is not necessarily confined to the outlines of the object. The slat that is a part of the crate is suddenly no longer a part of the spatial crate pattern at all. It is included in the space-time, banana-procuring pattern.

The same thing occurs when a screen comedian sees a broom which at once becomes a paddle with which he propels his barque to safety, and when another bites off the mouthpiece of the telephone as if it were a peppermint wafer, and, spying an ink bottle, drinks the ink. It is not necessary to employ such bizarre illustrations, however. Barrel staves may become blocks to build a house to a child, skis to a small boy, disciplinary paddles to the collegian, and kindling wood to the pater familias. A chisel may now be a screw-driver and now a can-opener to the maladroit household mechanic. In each case it is drawn into or inclosed in a different structure. The same chair, at different times, may be an object of pride because of its cost, an object of admiration because of its beauty, something to sit in, or something to stand on to hang pictures—all to the same person, because of the different pattern or arrangement of things of which it becomes a part. It all depends on "how you look at it."

When something that was only a stick thus becomes something else which will aid a person or animal to do what he wants to do—when the wall, instead of being an obstacle, becomes "something that one may run around," it is apt to occur suddenly. The person's face lights up, the child "laughs joyfully," the dog gives a sharp bark and starts off at a run, the man exclaims "Aha," or "Eureka," or something of

the sort. "It just came to me all at once," he says, or "The idea just popped into my head when I wasn't thinking about it at all." And his friend says, "You are an ingenious fellow: I wish I could think of things like that." And the inventor, the electrical wizard, the "handy man about the place," the child, the chimpanzee, and the dog, each on his own level, are one flesh. Something in the kaleidoscopic pattern of things shifts, it is seen in a different light, and the inspiration "comes."

The term insight has been used to apply to such situations, in which an individual makes the correct response on the first trial, or at least makes a response that is judged by the human observer to take into account certain relationships in the problem situation. As Koffka put it, "Insight, as the direct utilization of the relevant parts of a situation, was [by Köhler] contrasted with blind trial-and-error, and it was shown that the latter was not the type manifested by anthropoids under certain conditions."[9] Later he referred to insight as the "organization of all the determining factors."[10]

The term is not an explanation of problem-solving behavior, but a name for the process of finding these solutions which were not obtained by an aimless running-around or by the inconsequential manipulation of objects near at hand. Insightful behavior is certainly different from the blind hammering in by repetition of a random response that happens to be successful. In many cases it is clearly more than the sudden recognition that the chance response is successful, followed by the recall of that response when the situation again presents itself. It may involve the presence of previously acquired connections acting through recency and satisfyingness, and more or less loosely organized into a system.

A gorilla brought out a bundle of hay from her bed to use as a cushion when the ground was wet where she had to sit to do her experiments. She had previously experienced satisfaction and annoyance in connection with beds and puddles and, in this rare case, responded accordingly. Such behavior may be a response by analogy made possible by the presence of an unusually large number of connections. One writer viewed it as "only a case of rapid, unanalyzed learning, the end point of a lot of trial-and-error thinking which plays an important part but doesn't get measured with our crude instruments." But, besides being an evasion, this answer gives more credit to the mentality of apes, to say nothing of dogs and chickens, than seems quite justified.

[9] K. Koffka, *Principles of Gestalt Psychology*, New York: Harcourt, 1935, p. 628.
[10] Kurt Koffka, *op. cit.*, 641–642.

So far as trial-and-error and insight are concerned, however, the experiments would seem to show that it is possible to get sudden learning or delayed learning with random movements and chance successes by varying the complexity of the problem so that it includes many or few blind alleys, necessitating many or few detours. If, for example, the dog in the set-up shown in Figure 65 found a fence extending from *F* to *C* and another from *C* to *D*, with perhaps other blind alleys to impede his progress, his "insight" would have been a delusion and a snare. He would then be in about the same kind of situation as the animals in the maze. It looks rather as if the trial-and-error is the unanalyzed learning made up sometimes of random activity and sometimes of successful and of unsuccessful "insights."

Functional Thinking. The chance, mechanical stumbling on a solution has been contrasted with what has been termed functional thinking.[11] This implies that the person, keeping the goal in mind, casts about for "something that will" serve his purposes. The chimpanzee goes to the back of the cage, away from the lure, and brings the stick forward, or joins two sticks to make a longer one.

Maier devised a number of problem situations both for rats and for human subjects.[12] In the former experiments, he employed the elevated pathway maze, giving the rat an overview of the whole set-up. The common factor in several of the situations was that the rat, at different times, was allowed to wander about on two separate parts of the apparatus. When the parts were joined, it made the roundabout trip to the food box, though the junction was not visible from the starting-point. The two separate experiences were apparently connected mentally, which does not occur if a fifth of the rat's cortex has been extirpated. Maier termed this joining of two separate experiences reasoning.

In one of the experiments on humans, two strings were hanging from the ceiling, and the college students who served as subjects, one at a time, were asked to tie these strings together. However, the strings were too far apart for both of them to be reached at once. In this situation some additional construction is necessary. Four possibilities

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[11] Karl Duncker, "On Problem Solving," *Psychological Monographs*, vol. 58, No. 5, 1945.

[12] N. R. F. Maier, "An Aspect of Human Reasoning," *British Journal of Psychology*, vol. 24 (October, 1933), 144–155; "Reasoning and Learning," *Psychological Review*, vol. 38 (July, 1931), 332–346; "Reasoning in Humans: I. On Direction," *Journal of Comparative Psychology*, vol. 10 (April, 1930), 115–143; "II. The Solution of a Problem and Its Appearance in Consciousness," *Journal of Comparative Psychology*, vol. 12 (August, 1931), 181–194.

present themselves, though some of the subjects could not even think of one:

1. Hold one cord in the center while the other is reached.
   Solution: tie it to a chair.
2. Lengthen the cords.
   Solution: tie a string to one of them.
3. Extend the reach.
   Solution: use a stick to pull one cord in.
4. Make the other cord come nearer.
   Solution: tie a weight on it and swing it.

Each solution requires a different construction, a different "something that will" produce the needed structure. For example, in the case of the fourth solution, the present experience of a dangling string is joined with previous experiences involving a pendulum. When this restructuring takes place, the problem is solved. All that remains is the mechanical job of constructing a pendulum. The laboratory pliers were found and used as a weight, but they had to be taken out of their pliers-on-a-table pattern and placed in the weight-on-a-string pattern. The same thing happened that occurred when the chimpanzee pulled a slat off the crate to rake in the banana. If a slat is only a slat, or if pliers are only pliers and nothing more, the problem will not be solved —at least in that way. But the weight-on-a-string pattern becomes a new, organized whole that determines the nature of the parts.

Availability and Fittingness. If the subject had never seen a pendulum or had never heard of such a thing, he would not have had that experience to bring to the problem situation. There must be the memory, or what Koffka called the "trace," of the pendulum experience, or the subject will not look around for a weight and use the pliers that are near-by. But Koffka pointed out that the trace must be "available." The subjects who did not solve the problem had also had experiences with pendulums. In connectionist terminology, they did not "associate" a hanging string with a pendulum on the basis of similarity or contiguity. The gestalt psychologists do not like this view because, as they point out, the hanging string might be associated with rope climbing or tying up parcels. But this may be just what happens in the case of the failure. The subjects see the string in other patterns, and perfectly good patterns too, but not in the one that fits the present situation. If the correct solution "comes," the connectionist would have to explain it by "chance," or by previously rewarded experiences. The gestaltist

says that it is by continuation and closure, the principles that were discussed in the chapter on perception. The incomplete space-time pattern is rounded out and completed, as it were, by projecting the lines as when the triangle was completed. A hanging string completes itself as something that will swing back and forth because of a weight at the end. The mental reorganization can be checked with "reality" by actually attaching the weight and trying it out.

Fixedness. Suppose the pliers remain pliers, or the slat remains a slat, and nothing more. The problem would not be solved. Individuals apparently differ greatly in their ability to see things as something else. Undoubtedly, *earlier experiences* of the individual account for some of the differences. Then too it makes a difference how closely what is sought is already *identified* with some other pattern. A slat that is identified as part of a crate is more fixed than one which is lying by itself on the floor. A third factor is *use*. Subjects who have already used a tool for one purpose are less likely to use it in a different context than those to whom it is equally available who have not used it before. A cork that was preutilized as a stopper of an ink bottle was less likely to be used to wedge a board across a door frame than a cork that lay on the desk with other objects.[13]

5. Set or Direction

Experience. The degree of *fixedness* of an object in a situation has been shown to depend in part on the recent experience of the subject with the materials available; while *flexibility* may be a product of frequent use of an instrument in different situations. The same conditions may be expected when the solution is attained not by the use of a material object, like a slat, but by a way of behaving—say by arguing, blustering, collecting data, preparing a brief, or organizing a pressure group. The means that come to hand are those with which one is familiar, and they may or may not be applicable to the new situation. If one solution has "worked" in a number of situations, there will be a tendency to employ it in the next one of a similar nature, even though a different solution would be more effective or perhaps necessary. When the results of its use are immediately apparent, its effectiveness can often be judged at once. But when they aren't, people tend to go on doing the same wrong or useless things. Examples of this are found on every hand, as when useless or harmful "medicines" are taken, when rationalizations or other autistic devices are employed to evade an issue, or

[13] Karl Duncker, *op. cit.*

when "discipline" is applied in a firm and vigorous manner so satisfying to the applier, who may never realize the full effect of his treatment and may even take pride in a reputation (the only kind he can acquire) of being tough, or hardboiled, or mean.

A culture tends to be conservative in that it continues its old "horse-and-buggy" ways even when they are manifestly unsatisfactory, whether they are ways of governing a city, running an industry, dealing with criminals, maintaining mental health—or teaching school.

True, in education, as in other areas, a line of action based upon experience usually works fairly well. The school keeps running, the children study their lessons as much as can be expected, and salaries are paid. And yet, there are real dangers of trusting too exclusively to this clue. In the first place, any one person's experience is too narrow; further inquiry might disclose contrary practice. Secondly, experience is the blind following of the calf track of custom, itself being largely authoritarian in its sources: a teacher snaps his fingers and keeps pupils after school just as his teacher did before him. The result is no progress, and present practices, which admittedly leave something to be desired, are perpetuated. And, thirdly, experience is unable to cope with new situations. For example, what works in one school may not work in another. What fits into an agrarian community may not be successful in a mining town, or in a suburban or metropolitan area.

Analogy is a special case under experience: an individual may react to a certain feature of a complex situation in a certain way and then react to the same or similar feature in an otherwise different situation in the same way, in spite of the fact that quite a different response may be demanded. In the case of simple adding and adding as a part of the process of multiplication, or stealing at home and stealing in a foreign country, the identical elements in the two situations may properly occasion the same responses. But the child who reacts to a skunk as he does to a nursery kitten, the boy who dislikes another person on sight because he looks like the school bully, and the man who decides complicated educational or political questions satisfactorily to himself at least on the basis of simple proverbs, fables, and rules of thumb, are all deluding themselves. They see a part, but not necessarily the significant part, of the situation.

Another source for the discovery of solutions to problems is *inference*. This is the process of forming a judgment or conclusion derived from known facts or beliefs. It is the verbal consequence of insight. One may have a "hunch" as to the best way out of a difficulty. This is sometimes

referred to as *intuition*. As such, it becomes a mysterious ability—one that women are supposed to have in greater quantity than plodding man, and that seemingly enables them to fly rapidly ahead of the slower-moving rational process. An intuition is a judgment derived from premises or data that are not clearly apprehended, and without an adequate check on the correctness or significance of the results. It is in reality a hypothesis or a chance solution, or, if you will, it is the perception of arrangement, pattern, or gestalt coming about by the process of mental reorganization previously discussed. It may or may not prove correct.

Many are the false solutions that history reports. The insane have been chained, Quakers have been scourged, "witches" have been burned, children lashed, the ill bled, and prophets stoned. These things were instigated and carried out, not by the criminal and insane, but by mature "respectable" men and women, and not rashly, but after due deliberation. Unfortunately, it would not be difficult in these troubled times to discover people employing equally mad "solutions" for current problems. It may be quite disappointing to the student to think that he may sometime be quite as wrong as his elders. But he may not. He may learn to restructure his problems more adequately and to avoid the autisms of frustration behavior and the pitfalls of authority, fixedness, analogy, and intuition. But, more important still, he may learn to test his solutions more carefully.

Reasoning. The term reasoning is used somewhat indiscriminately to mean a number of different processes, all of which, however, involve a mental solution of problems in contrast to a blind trial-and-error solution. As was previously stated, Maier uses the term to apply to the process which involves two previously separate areas of experience. This might be thought of as the smallest unit in the thought process, comparable on the verbal level to the term inference, which applies to a conclusion (solution) derived from separate data or postulates. For example, if the rat could verbalize, he might say, "I have played around in part A of the maze, and when placed in part B I could get at the food. I would infer that I could get the food without waiting to be put in part B if I could somehow get there myself!"

Similarly, the college student, in Maier's experiment with the two strings hanging from the ceiling but too far apart to be reached simultaneously, reasons or infers that if he could anchor one string while he gets hold of the other he could then tie them together and so solve the problem. Or if he could hook one toward him with a stick, or

start one swinging pendulum-wise by tying a weight on one end, he could bring the two ends together. Such inferences or solutions reveal the functional thinking which evidences a restructuring that, as we have earlier seen, occurs when a person has "insight."

There are many cases of what might be called a partial insight, or incomplete restructuring, that have been called *good errors*. Irrelevant experiences are juxtaposed and the solution is not found; the inference is invalid. Köhler reports the case of one chimpanzee who attempted to get a banana suspended overhead, the way the others were doing. She pulled the box over until she was nearly under the banana, then got a run, jumped on the box, then to the ground, and from there she jumped for the banana! Similarly, a little girl was shown by example how to use a stick to knock down a toy that was too high to reach without it. She took the stick in her right hand and reached toward the toy with the left. When this failed, she shifted the stick to her left hand and reached for the toy with her right. The stick was not recognized as a functional part of the structure.

One is tempted to ponder over analogous situations, as when a man tries to appropriate the techniques of his superiors and succeeds only in adopting their mannerisms, or when a youth thinks his attendance at college will better his social position, or when a school adopts a course or a curriculum that has worked well elsewhere, or an autocratic regime institutes some of the forms of democratic government. All of these may be successful means to desired ends, but, if they are not a functional part of the total structure, they will hardly be effective.

The term reasoning is also applied to a more extensive process of finding solutions, discovering their inadequacy, seeking others, modifying them, checking on their effectiveness by carefully observing the results of their use, modifying again, and so on. Such extended processes involve innumerable reasoning acts of the smallest-unit type. The solution of one difficulty turns up a host of others that require attention, so that the individual in the proverbial phrase may find that "he has got a bear by the tail." This condition is only to be expected, for any single restructuring would naturally be expected to affect the structure of related parts.

On the other hand, it is sometimes possible to effect a solution which clears up a number of other difficulties. In the school, for example, the resolution of an adjustment conflict of one child may reduce the difficulties of all his teachers; the adoption of democratic procedures, if properly handled, may reduce internal dissension; and clearing up a single verbal misunderstanding may eliminate a number of intellectual

difficulties. So many human problems are on the verbal level, that is, they relate to words and their interpretation, that some of the pitfalls and some of the guideposts to their use in thinking should be pointed out.

6. Acquiring Meanings

Meanings and Problem-Solving. In Chapter X the acquisition of meanings was discussed as a selective process like perception. But it is more than this. In many kinds of situations it presents real problems which require solution.

Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in right relations, and also with the right amount of weight or influence or force for each. The mind is assailed as it were by every word in the paragraph. It must select, repress, soften, emphasize, correlate, and organize, all under the influence of the right mental set or purpose or demand.[14]

The importance of a word in a sentence or paragraph depends basically on the object to which it refers, and the determination of what this object is often presents difficulties if semantic errors are to be avoided.

The learner must, in the first place, know the basic meaning. It must mean *something* to him, and that something must be more or less like what it means to others. Some seventh-grade pupils in social studies thought that the statement, "The mail was . . . very irregular" [in 1775] meant "trains would get broken down," "it went in a straight line," and that it "zig-zagged all over." Eighth-grade history pupils defined "primitive," from a paragraph describing the method of starting a fire in 1763 by the use of flint and steel, as meaning "the only way," "the easiest way," "the most used method," "the most dangerous way," and "a new way." Others defined "the parallel of thirty-six thirty," of the Missouri Compromise, as "the two lines of the year thirty-six," "the year of 1836," "the year 336," "half and half," and "the 36th year on the 30th day."

A somewhat different problem presents itself when a familiar word is used in an unfamiliar way. When a child learns to respond to c-a-t, and to a certain animal, by saying cat, a process of conditioning is involved. But if a keeper at the zoo tells him, "It is about time to feed the cats," he may get the wrong idea. He must have seen, let us say,

[14] E. L. Thorndike, "Reading as Reasoning: A Study of Mistakes in Paragraph Reading," *Journal of Educational Psychology*, vol. 8 (June, 1917), 323–332.

a leopard, a jaguar, a tiger, and a lion. He must have selected or abstracted certain qualities among which size and color were not included. He may earlier have stood before the tiger cage and suddenly exclaimed, "Why it's a kind of great big cat." His thought process might be put in the form of a syllogism: Animals that look so-and-so are cats (felines); this strange animal looks so-and-so; therefore this strange animal is a cat. He has thus enlarged his concept. The minor premise, which had previously been floating around as a disconnected piece of information, suddenly became reorganized into a new pattern, and the conclusion was for him a new truth. After such an experience he would understand what the guard at the zoo meant.

Often a word has several different meanings. These range from common words like "fix" and "band" to words with complex meanings like "state," "proposition," or "honesty." Sometimes seemingly simple words have different meanings, a fact that is not always appreciated. For example, "of" in the phrase "the State of New York" and "of" in the phrase "government of the people" are really two different words. The same is true of the word "is" in "the man is running" and in "man is an animal." In all such cases, the whole—that is, the context—determines the meaning of the word. The different meanings that a single word may have render somewhat ridiculous some of the word lists[15] when they are used to determine the "vocabulary load" of textbooks and readers. For example, the sentence, "What a thing seems may not be what it is in itself," would probably not be comprehensible to first- or second-graders; yet all the words in it are supposedly appropriate at this level or below, and all but "itself" are in the first thousand most frequently used words of the Thorndike list.

Many meanings have no single word to represent them, so that roundabout phrases must be employed. The administrative head of a school is the principal, but there is no one word for the director of practice teaching. Extremes like good and bad, rich and poor are common, but intermediate terms are difficult to find. The word "cooperation" is commonly used to mean working with others toward a common end; but there is no such word for "wholehearted devotion to a just cause."

In this connection, the sometimes vague meanings with attitude connotations should perhaps be mentioned. "The pursuit of happiness," "the quest of the Holy Grail," and "the nightingale's complaint" will perhaps serve as illustrations from the political, religious, and poetic spheres respectively. Wordsworth was sorry for the person for whom

[15] B. R. Buckingham and E. W. Dolch, *A Combined Word List*, New York: Ginn, 1936.

a "primrose by the river's brim" was nothing more than just another primrose. Such phrases for many people stand for valued emotional attitudes and sentiments, but mean little or nothing to others. The appreciation of poetry in large measure consists of abstracting from one's experiences those parts to which the poet refers and building them into new and significant patterns.

Abstract Meanings. When the meaning is acquired, it becomes a part of the equipment of the individual which enables him to classify the events of his experience and so make his world meaningful. Sometimes difficulties present themselves, as when he puts someone in the category of a "good influence," or an "able leader," and then the person does something that is "disappointing," and so has to be reclassified; sometimes it works the other way. One learns what he can do and still be considered honest, or, more fortunately, he learns of additional qualities that an able leader must possess, and so enlarges his concepts, in the same way that the child does before the lion's cage.

A peculiar psychological change sometimes overtakes abstract terms. They become things, that is, causes of events and objects of desire, if one is not careful. Peace, glory, honesty, instinct, and heredity are viewed as things to fight for, or productive of good or bad results, as the case may be, when they are not really things at all. Such a process is called the *reification of abstractions.*

But the process goes further, from reification to *personification,* when the terms get spelled with capital letters as they sometimes do: "Progressive Education teaches," "Justice demands," "England expects," "Lincoln School stands for," and so on. When personification is employed as a rhetorical device, the meaning is often clear and expression simplified; but frequently confused thinking and muddled action result from thus clothing a multitude of behavioral responses in human garments and making the result talk like a man. Many meanings and many kinds of responses may be connected with such terms as these, under varying conditions; but error is likely to result when they are all grouped together and made to apply to behavior in a particular set of circumstances.

Occasionally, the process takes a further step, *deification,* which makes the term a subject for adoration and worship and enables it to give orders and exact obedience. One may "worship at Beauty's shrine," hold services ("pep meetings"), and sing hymns in praise of Alma Mater, and demand the death sentence "in the name of Patriotism."

The acquisition of abstract meanings, whether or not they are thus

emotionally loaded, may be seen from the illustrations given to involve
the same process of insight that was described in the experiments. A
term may represent one concrete area of experience, then another. As
a consequence, a mental reorganization takes place and a concept is
built up. Then a new experience is added which calls for a new reorgani-
zation. Schools provide a variety of experiences, actual and vicarious,
to aid in the process of enlarging pupil concepts. The restructuring of
the pupil's mind follows the structure of the world of his experience.
As he becomes more familiar with the terms he employs through the
concomitant variations in which they are met, he learns to abstract
and select certain patterns for one context and other patterns for other
contexts. The word "state" furnishes a good example: "State the
causes. . . ."—that is easy, as is "the state of New York," and even "a
state of uncertainty," though it may be some time before such a sen-
tence as "The state is the people and not the government" may be
adequately analyzed.

John Dewey has referred to the educative process as the reconstruc-
tion of experience, a "meaning" that is somewhat difficult to acquire.
But it gains clarity if viewed as restructuring situations in harmony with
other (restructured) situations through the process of enlarging con-
cepts and selecting meanings.

Classification. Owing to the fixation phenomenon, it may be difficult
for a chimpanzee to take the slat out of the crate context and put it
in the food-getting pattern. It may be equally difficult for the college
subject, in the hanging-string experiment, to remove the pliers from
the tool-kit category and put them into the pendulum configuration.
But it is as a rule far more difficult for the average persons to take a
particular segment of behavior out of one context and classify it in
another. For example, someone states an untruth. Many would not hesi-
tate to classify such a statement at once as a lie, a morally reprehensible
act, without knowing any more about the circumstances. But a moment's
thought reveals several other possible categories in which it might be
placed. Legally, it may be misrepresentation, libel, or perjury; intellec-
tually, it may be ignorance or stupidity, or superstition; psychiatrically,
it may be an escape or a delusion. It may be morally neutral, as in the
recognized overstatements of advertising, or it may be even commend-
able as a joke, a social pleasantry, or a charming bit of fiction.

Any classification, to be sound, must have a unitary *basis*. If one is
classifying buildings he would not divide them into large buildings,
wooden buildings, and office buildings. In such a grouping there is no

common basis of classification. One must classify all buildings according to size *or* materials *or* function, and so on. Any particular structure can then be classified in whatever category is of significance at the moment. The house I am looking at may be of stone, which is all right, but the cost may be too high to interest me as a prospective buyer. Similarly, the untruth might be classified as a crime and be legally punishable, unless I and other citizens are more concerned with education or rehabilitation than with vengeance, as we often are in the case of juveniles and of neurotic cases. In fact, it can be said that the great changes in the past few years in the treatment of deviates has come from regarding them not as transgressors of laws of divine or human origin, but as human beings who are sick and in need of help and care. We might summarize by asking what should be done with a delinquent. The answer depends on how he is regarded; that is, classified. He may be regarded as a genius to be pardoned, as a nuisance to be punished, as a thief to be jailed, as a human soul to be saved, as a minor to be re-educated, or as a patient to be cured.

Prejudice and Stereotypes. It may readily be recognized that people differ in the ease with which they can think of a particular act as belonging in one or another category, just as Köhler's chimpanzees differed in their ability to perceive parts of their environmental pattern in new relationships, as the puzzle subjects differed in the "flexibility" with which they gave up one line of attack on a puzzle and tried out others, and as some individuals will say of a delinquent act, "It's a crime, isn't it? Then it ought to be punished," without regard to ends sought or the possible consequences. Such persons are said to be prejudiced. Prejudice may take other forms, for example, in favor of a kind of treatment when categories are agreed on. But more often than not it consists of holding tenaciously to one view, one way of regarding a situation—that is, to one pattern of events, and not allowing them to form into other patterns.

Such prejudices, or prejudgments, often become as stereotyped as those which categorize various groups of people, previously alluded to. An old man looks at a modernistic house and says, "That doesn't look like a house!" Of course! No slant to the roof, no blinds, and inside, no doors, no trim. Or the same old-timer visits a modern school and wonders what we are coming to. He is the blood brother of the rustic who looked at the giraffe and said, "There ain't no such animal!" Their concepts have become stereotyped, and there is little possibility of further mental reorganization.

But such judgments are not confined to arteriosclerotic old age. Younger people are often quite as guilty as the oldsters. Children have their own ideas as to how their parents should behave. Young parents often resent any suggestion that they don't know how to bring up their own children. All are apt to be mistakenly prejudiced about matters with which they are concerned but in connection with which their experience has been limited or unassimilated. The problem is an important one for educators, who not only have the responsibility of being rational but are entrusted with the task of aiding in the rational development of the coming generation of children and youth. Teachers can continue to enlarge their concept of what it means to "teach a subject" and reorganize that concept with that of "teaching to think." Such a mental restructuring involves, among other things, the viewing of segments of conduct and of verbal behavior under new categories. And new schoolroom techniques are being devised to this end.

Categories and Human Values. When the subject in a problem experiment gets the food or otherwise arrives at a solution, there is no doubt about its correctness. The time taken may be reduced somewhat with practice, but the problem is solved, and solved correctly. All other "restructurings" can be classified as wrong. The slat cannot stay a slat if the food is to be obtained. The food was the end sought and its attainment proved the validity of the course of action that preceded. Similarly, in a good many human problems, both verbal and other, the outcome or consequence of the undertaking determines whether or not the correct method was employed.

But in some human problems, even though there is an outcome, there may still be uncertainty as to whether the problem is solved. The question hinges on the evaluation of the outcome. For example, if a man is hungry and gets food, it might be inferred that he has solved his problem; but, if he also gets clapped into jail for stealing it, or begging or peddling without a license, doubt is thrown on the correctness of his solution. It might, with some scientific generosity, be classified as a "good error," but that is about all. Similarly, if vigorous autocratic control produces quiet in a classroom, superficially the disciplinary problem has been solved—until objects begin to fly through the air, or the truancy count rises. Likewise, a school is supposedly doing good work academically if the pupils pass their examinations—providing that a large proportion have not been eliminated from school, and that the rest will be well fitted for the life they will have to lead when it comes their turn to leave.

The consequences determine whether or not the solution is correct, but all the consequences, not just one or two, must be considered. Further, the consequences must be judged in terms of the nature of the desired ends which are sought. Such desired ends are frequently spoken of as values. Academic or scholastic values have been rather exclusively considered in judging the effectiveness of school procedures, but ethical, utilitarian, and social objectives also play an important part. So, if one must decide what is to be done about the case of a juvenile offender, the problem is "solved" if he is apprehended, or if he is sent to jail, or if he is put in a correctional institution, or if the affair is hushed up and he succeeds in graduating. But what solution is the best? The answer depends on what one is trying to do: get a conviction, save a life, or better the community. It depends on one's set of values.

Problems of human conduct differ sharply from problems in mathematics, say, or the natural sciences or mechanics, in the matter of agreement on the solution. The column of figures always "adds up" the same way, or, if it doesn't, there is agreement among experts as to where the error lies. Regularities of nature have been worked out and the margin of error determined. It is possible to get the answer, or to agree that the answer is unattainable with present techniques and at the present stage of development of knowledge.

How different the situation when it comes to determining whether a child should be placed in a foster home, whether an employee should be retained on the payroll, how to reduce the public debt, how a criminal should be treated, or what are the rights of the people who do not have the influence—or the guns! It is common in such cases, where the problems involve human values, either to differ amicably, to argue heatedly, to reach a solution by force, or to evade the issue by agreeing that it is one for philosophy or religion to decide. While it is true that philosophical principles and religious doctrines are often guides from which specific solutions may be deduced, it is difficult to find any kind of behavior that presents a problem to mankind that is not supported by some accepted philosophy or religion—often one's own. Scriptural passages are cited to support both sides of a controversy, whether it is slave-holding, the use of alcoholic beverages, or the sparing of the rod. The philosophers and theologians seem to be people of their own age and culture first, and capable of interpreting their doctrines accordingly. Others have the chance to choose the solutions they prefer, so long as they are not too much opposed to the mores of the group in which they live.

But what criteria shall an individual employ as a basis for his choice

of a solution of his particular problem? We have seen that he must consider the consequences of his acts—not one or two, but all possible consequences. He may be just, so long as he does not injure those about him. He may be provident so long as he does not rob others to supply his wants. He may be active so long as he does not injure his health. He may help others so long as he does not subject or pauperize them. He may be devoted to intellectual or esthetic pursuits so long as he fulfills his financial obligations, and so on. The criterion seems to be that one value may be pursued so long as it does not reduce other values below a recognized minimum. The human values may be thought of as the outgrowth of human needs—health and activity, knowledge and truth, esthetic satisfactions, individual adjustment and security, mastery, and service and helpfulness.

While such a rule of thumb will not resolve all difficulties at once by any means, it will yet clarify a great many. And, although the great mass of citizens may consult their authorities for advice and counsel, they will do well also to match the consequences of their proposed solutions against the different human values. Such a phrase as "the conscience of mankind," if it means anything at all, implies a fundamental agreement on the relation of certain matters to the things we all value.

Testing the Solution. To summarize: Suppose one finds a solution; how is he to learn whether or not it is correct? On the authoritarian basis, he will check it with a higher authority and hope they will agree. On an empirical basis, he will know, because the solution worked before under the same conditions—if they were the same conditions. On an inferential basis, or on any other, for that matter, the obvious test is the pragmatic one: *Does it work?* What are the consequences? Are they what was desired? Does the felt difficulty that gave rise to the problem disappear—without giving rise to too many other difficulties? A medicine that cures the disease but kills the patient is hardly satisfactory. But, in general, it can be said that the proof of the pudding is in the eating, that the solution that satisfies the need passes the test of validity.

In symbolic or verbal problems, the pragmatic test becomes the test of *agreement*. Is the solution in agreement with what is accepted as true? If it is not, the solution is incorrect—unless what has been accepted as true is not true after all. This has been the case in many of the discoveries of science—the law of falling bodies as established by Galileo, for example, or the action of micro-organisms as opposed to the doctrine of spontaneous generation as demonstrated by Pasteur. But,

if an arithmetic problem comes out with the cost of eggs at $40.00 a dozen, the height of the man as 17.4 feet, or the amount of time that A worked in one day as 25 hours, the chances are that the solution is incorrect. And if there seems to be no single correct solution, as in "moral" problems—that is, in problems of human relationships in which authorities disagree on the "right" answer—the best solution may be sought along lines which promote one or more human values without doing violence to the others.

7. GUIDES TO CORRECT THINKING

a. Locate the Problem. Whatever the area in which the difficulty lies, there are certain principles of procedure which must of necessity be followed if the problem is to be satisfactorily solved. These principles may be called guides to correct thinking, and the first is to define or locate the problem. The problem is often obvious enough. Sometimes, however, the situation is so complex that everything seems to be the matter; in such a case it is necessary to *analyze* the total situation into its parts and *abstract* for consideration only the most significant. Suppose a beginning science teacher finds that the children are not behaving as they should during the laboratory periods; there is a good deal of commotion and loud talking against which his remonstrances are quite ineffective. Here, surely, is an opportunity for the solution emotional, the solution evasive, or the solution impossible! Let us instead try analysis: There are no doubt several separate problems that need separate solutions. Perhaps the interrogative predicables (see Chapter XIII) will help:

1. When is the disturbance made?
2. Where is it?
3. How is it made?
4. Who is making it?
5. Why?

The answers to questions 1 and 2 may show that it is mostly at the beginning of the period, at the end of the period, when the children are getting their laboratory notebooks, in the hallway, at the desks, or in the supply room. The answers to questions 3 and 4 may show that it is stamping, talking, whistling, or throwing marbles on the floor, chiefly in the neighborhood of two or three boys. The answer to question 5 may show that there are not enough books, that some of the "culprits" are compensating, over-age repeaters, that some are bright

children who become trouble-makers when their work is done, or that it may be any number of other things. How much better to meet the problems squarely, one at a time, than to weep, rationalize, or give up!

Usually, in the more complicated problems, the facts do not lie so clearly exposed to view. Any effort to treat the handicapped child more fairly in the schools involves a survey of such factors as the number of such children of different ages, their stage of advancement in school, the extent of their disability, the vocational opportunities in their neighborhood. Fact-finding commissions, questionnaires, rating scales, and tests may be necessary to bring the facts of the situation into the foreground, that they may be analyzed and the different problems dealt with separately.

b. Determine the Conditions. In demonstrating a proposition in geometry, it is important to get clearly in mind what is "given"; that is, the conditions under which one is to work. If two right triangles are given, one must know this, and not merely that they are two triangles. In some problems, the conditions may be readily observed, if one is able to observe them. In a T-puzzle, the problem was to put four pieces of cardboard together to form a block letter T with square ends. The model was in front of a number of college students who served as subjects; yet many persisted in placing pointed instead of square blocks at the ends of the cross piece and at the bottom of the upright part of the letter in spite of the fact that this could not possibly be right.

In the example of the science teacher noted above, the process of allocating the problem involved a determination of some of the conditions. If the problem seems to center in one particular child, one might well ask: "What kind of a child is he?"—one who is used to punishment, a sensitive youngster, a child who usually behaves well, one who has other misdemeanors chalked up against him, one of a gang, or one who wants to belong to a gang?—and so on. What rules must be followed, what implements are available to work with, what costs are allowed, what political influences are at work, what ends are sought? —all these and many other data must be taken into account in the varied kinds of problems one may meet in the course of a few days or years.

c. Note Each Solution. As we have seen, the process of discovering a solution, whether it turns out to be correct or not, takes place in different ways and goes by a number of different names. It has been viewed as mental trial-and-error, a conditioned response to a part of

the environment, the association of ideas, the result of a set, appercep-
tion, and insight. By others it has been called a guess, intuition, inspira-
tion, and an answer to prayer. Most of these explanations have already
been considered; so we shall now use the scientific term *hypothesis*.

The hypotheses differ as the situation is viewed in different patterns.
In the case of the problem child, such possible solutions as the following
imply different kinds of data in the case record: punish him, be nice to
him, encourage him, reason with him, reclassify him, and so on.

d. Try Out the Most Likely Hypotheses. Some "solutions" can be
crossed off at once. One or more of the most likely may be tried out.
This step usually involves actual behavior, such as moving objects about
in space, interviewing people, or using a calculating machine. In the
discipline illustration, such suggestions as the following occur for the
different phases of the problem: try a different system of distributing
books, get more books, more apparatus, test some of the children and
so get them better classified, discover individual differences, satisfy long-
ings for recognition in other than antisocial ways. In other words, the
teacher may use some of the theories and suggestions from his training
course, if he can separate them from their "fixedness" in the pattern of
lectures, notebooks, and examinations, and can think of them in connec-
tion with actual problems.

e. Record All Trials and Their Consequences. A record is, of course,
unnecessary in some of the simpler problems, providing the individual
can remember what his previous trials were. If the problem is important,
or at all complex, it is well to keep in a manila folder or a notebook
a record of the trials made, the evidence collected, and the results
obtained. This saves the endless repetition of the blind-alley type of
errors that consumes so much of the time of the subjects in the experi-
mental situation.

f. Invite Further Suggestions. People differ widely in what may be
called fertility of suggestion—some are forced to an inferior solution
for want of a better idea, while others are inactive amid their embar-
rassment of riches. One thing to do when suggestions run low is to
forget about the problem, do something else, and then come back to
it later. The situation may then be viewed from a different angle or
with a different set. The bearing of factors not previously thought of
in that connection may be considered, and this new arrangement or
gestalt may result in a new insight, a new hypothesis. Another thing
to do is to seek advice. An outsider with knowledge along these lines

might be able to make the suggestion that would prove to be the correct one, as well as to furnish the information about the consequences of other somewhat plausible solutions. In order to pool the resources of suggestion and technical knowledge, the *committee* has become a very effective instrument in meeting practical difficulties.

g. Generalize Cautiously. In a practical problem, such as getting a car started, finding the hammer, deciding about college, or choosing a husband, the solution in the one particular case is enough: one car, one hammer, one college, or one wedding is the immediate concern. In scientific investigation, however, it is important to discover principles of more nearly universal application. The careless mind is prone to make easy generalizations on the basis of far too meager data. It may or may not be safe to conclude that cars always have something the matter with them when you are in the greatest hurry, that all children who have difficulty with their work should drop back a grade because it worked well with one, or that all blondes make good wives. One contrary case spoils a generalization. In spite of the widespread consolation afforded by the proverb, "the exception proves the rule," the statement is untrue. All it does is to imply the existence of a rule that doesn't hold. If all the cases which the available techniques have been able to collect are in harmony with the generalization, it is probably a safe one; but still fraught with hazard is that jump from *some* (the observed) to *all* (an infinite number), called the *inductive leap*, the key feature of the reasoning process by which one passes from the particulars to the generalization. This is the essential characteristic of *induction*. If the leap is successfully made, we have an *empirical* principle, one based upon evidence and sometimes called *a posteriori*, in contradiction to *a priori*, an authoritarian principle, arrived at deductively.

Whichever way it is derived, it may be the first step or *major premise* of a *syllogism*—e.g., all men are mortal; all fruits are acid; all despotisms are unjust; all schoolrooms where desks are screwed to the floor will foster poor instruction; the bright children are the youngest in the grade. Here we have an assortment of generalizations that may or may not be true; if they are true, the facts with respect to particular cases may be stated in the *minor premise* and the *conclusion:*

1. All men are mortal.
     Socrates is a man.
        Therefore Socrates is mortal.
2. All fruits are acids.
       Vinegar is an acid.
        Therefore vinegar is a fruit.

3. All despotisms are unjust.
    The heaven of primitive theology is ruled by despotic power.
    Therefore there is injustice in heaven.

Or, in abbreviated form:

4. The desks are screwed down in Room 17, so I knew what kind of instruction to expect.
5. He ought to be promoted; he is the youngest in the class.

It may be evident from the above that trouble can sometimes arise not only over the authoritarian or scientific origins of the major premise, but also in the process of drawing conclusions, which can result in fallacies, as in 2 and 3 above. The syllogism is the skeletal outline of *deductive reasoning* in which one moves from the generalization (major premise) to the particular (conclusion).

A syllogism may be refuted 1 by showing that the major premise is invalid, that there are other data which it does not include; or 2 by showing that the minor premise is not true or is not a particular case included in the generalization of the major premise; or 3 by showing that the conclusion does not follow from the premises. Otherwise the conclusion is inescapable. The conclusion reveals new truth to the individual if he did not previously know that the minor premise was implicit in the major premise. For example, a teacher might not know what is the matter with X, one of his pupils. Another teacher says, "Oh, he's a hypothyroid." In syllogistic form, this would be:

> Hypothyroid cases are low in energy.
> X is a hypothyroid case.
> Therefore X is low in energy.

b. Avoid Fallacious Thinking. The deductive processes of reasoning, charted by Aristotle in his *Organon*, determine, therefore, what particular truths are inherent in a given proposition; or, to proceed from the other end, they determine the truth of a particular statement by showing that it follows necessarily from an accepted principle or premise. During the scholastic period in the Middle Ages rather fantastic particulars were derived from quite harmless-sounding authoritarian premises that were taken on faith. The generalizations of modern science are evolved inductively, a technique elaborated by Francis Bacon in his *Novum Organum* in 1620, and major as well as minor premises are rigorously checked.

There are many possible errors of thinking besides those of a syllogistic nature. Bacon described four kinds of *"idols"* or fallacies that

unfortunately are about as common now as they were in his day. The "idols of the tribe" are those which derive from interpreting nature from the human instead of from an objective and impersonal point of view; the "idols of the cave" derive from the peculiarities or preferences of the individual; the "idols of the market place or forum" are those coming from words and language—what might now be called semantic errors, as for example from the careless or propagandistic use of terms, as previously discussed; and the "idols of the theater" are those which spring from traditional doctrines and great names—the use of authority.

The term *wishful thinking* has come into common use to apply to the tendency to lean to the solution that one desires. The effects of emotion, rationalization, and the like have been discussed in an earlier chapter. Various forms of superstitious belief are still quite common. *Superstition* refers to various form of animism, in which reified or personified abstractions in the form of "spirits" usually follow a definitely good or evil bent. Or superstition may refer to beliefs concerning the nature of the world and of man, beliefs that were formerly generally held, but have since been discredited through scientific investigations. Thus the belief that the world is flat, or that porcupines shoot their quills, may be called superstition. Many superstitious beliefs depend for their support on a misunderstanding of cause-and-effect relationships, such as the *post hoc ergo propter hoc* fallacy. What happens first is not necessarily the cause of what happens next, whether the two events are the rooster crowing and the sun rising, the breaking of a mirror and the death of a friend, the wearing of a charm and staying alive, or the studying of Latin and becoming a great man!

i. Check the Solution with the Facts. The testing of the solution has already been discussed. If a series of observations or a process of reasoning leads to conclusions that are directly contrary to common knowledge, or are not of universal applicability, it is better to examine one's steps than to act too quickly upon one's conclusions. If a conclusion does not agree with commonly accepted facts and principles, this disparity must be recognized, for it at once calls into question either the validity of the conclusion itself or the previously accepted facts and principles. On the other hand, if it is in agreement, if it works, it may be considered true until it is called into question by further evidence.

Short Cuts. If anyone conscientiously went through these nine steps every time he had to decide where to spend the evening, what book to read, or whether he would take coffee or tea, we should suspect

him of being a hypochondriac, with even worse symptoms in the offing. Of course one should short-cut the process if the problem is simply a matter of mood or personal preference. He may, if he wishes, merely ponder a moment as to whether there would be any important consequences one way or the other, just to be on the safe side.

It is often necessary to take short cuts even in important matters. The administrator in business or education is faced with problems day after day which must be acted upon at once, and for which it is impossible to get all the facts. He must get what facts he can, take a chance, and hope he'll average above 50 per-cent correct in his decisions. However, it would be a stupid administrator who was not aware of what might happen if his decision turned out to be wrong and who did not act in such a way that the consequences so far as they can be foreseen are not too destructive. And meanwhile he will have established a research bureau or laboratory with trained investigators such as are found in many industries and school systems to get the facts, so that many future decisions need not be so haphazard, and so that reorganizations and administrative policies may be planned on the basis of scientifically derived evidence.

8. The Scientific Method

Subject Matter vs. Method. In spite of the journalistic talk of wizards and magic in connection with the truly amazing outcomes of modern science, there is, of course, really nothing extramundane (out of this world) about it; it is essentially the method of solving problems that has just been described. For convenience, the phenomena of the world are roughly classified into different groups. The sciences viewed as *subject matter* are differentiated on the basis of the phenomena with which they deal, whether planets, electrons, or endocrines. But what makes them all sciences is the *method* employed.

Science as a method of solving problems differs from ordinary problem-solving in degree rather than in kind. The same processes are necessary as those which have been discussed, but besides these there are three important differences of emphasis: (1) the effort to discover natural laws; (2) more careful observation; and (3) experimental control.

Natural Laws. A law of nature is often spoken of figuratively as if Nature had made a rule that all the little animals must obey. Such a view is an animistic personification. Nor is a natural law like a legal enactment, a man-made rule of conduct implying disobedience and indicating penalties therefor. As a matter of fact, it is impossible to

disobey a law of nature; one can only illustrate it. Take gravity, for instance. The mountain goat that falls off the cliff or the child that falls out the window or the suicide who jumps off the bridge is not "disobeying" the law which states that the attraction between bodies varies directly as their masses, and inversely as the square of the distance between them. The law of gravity, like other natural laws, is a generalization, more universal in scope than it is given to man to formulate very often, but a generalization nevertheless, a statement of the way phenomena behave under certain conditions.

Such statements of law appear here and there as formulas in physics and chemistry books, less frequently in the biological sciences, and hardly at all in the social sciences. We read of Mendel's laws, the law of supply and demand, and the law of chance, for example, but the theory of evolution or evolutionary hypothesis, Helmholtz's theory of color vision, or the culture-epoch theory. The most important generalizations in the biological and social sciences are in the form of curves—the curve of learning and the normal probability curve, for example, which enunciate basic principles that are widely applicable. The concept of correlation should also be included, for by this means it is possible to state degrees of relationship between variables which show less than a one-to-one correspondence. When a generalization concerning the nature of a certain group is in agreement with many of the known facts, but techniques are not sufficiently developed to control all variables and dispel all doubt, the term hypothesis or theory is used, the latter usually signifying a greater degree of certainty than the former. Further experimentation may make it a law or throw it into the discard.

The invention of theories is a fascinating occupation upon which the scientifically minded have been compelled to frown, even though in so doing they have sometimes alienated the affection of their friends and rulers. The theory that harvests are more plentiful if human sacrifice is employed to placate the otherwise hostile gods took long to die, but it is fortunately not to be found in the curricula of our agricultural schools. The theory that some races are inferior to others, that those who have are more pleasing to the gods than those who have not, that war is ordained if not by the gods at least by the neurons, that the soul, the unconscious, the libido or the primal urge is necessary to explain our daily more-or-less ethical conduct—such a priori reasoning leads to arguments about the nature of those things rather than a fair-minded study of the phenomena they are called on to explain.

To avoid such pitfalls, William of Occam in the fourteenth century formulated the following principle: *Entia non sunt multiplicanda praeter necessitatem*. This principle, that theoretical existences must not be multiplied unnecessarily, which sought to cut away all useless abstract formulations has long been known as Occam's razor; it is also called the *law of parsimony* because in deference to it we should only grudgingly postulate the theoretical existence of causative factors and seek, instead, to explain phenomena on the basis of the well-tested knowledge. Lloyd Morgan, whose informal experiments on animal learning preceded those of Thorndike, reformulated this principle in such a way as to make it more directly applicable to psychology as follows:

In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty (or psychological process) if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale (or, in terms of processes which stand lower in the scale of psychological evolution and development).[16]

In this form it is known as *Lloyd Morgan's Canon*. The effort is thus made to explain animal behavior not by nature, or instinct, ideas, or a rational mind, if it can be understood as taking place through the operation of such demonstrable principles as recency, exercise, and effect, or by the process of conditioning.

Careful Observation. While opinions are apt to be based upon chance observations and the ordinary run of experience, judgments which have a right to be called scientific are made only when all possible data have been scrutinized with infinite care. All kinds of complicated apparatus have been designed to facilitate observation. The telescope and the microscope bring into the field of vision phenomena which previously were virtually nonexistent. The photographic film, the phonograph disk, the herbarium and the museum provide accurate permanent records of the data observed and permit classification and comparison. The use of units of linear measure from the millimicron to the light year make such words as "quite large," "much longer," and "somewhat less" as archaic as the oil lamp; while, with the introduction of a needle or pointer on a scale, the indirect measurement of such elusive things as temperature, weight, time, and electrical energy becomes possible.

A beginning of more exact observation is being made in the social sciences. We have learned to distrust our eyes and ears and to be no

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[16] C. L. Morgan, *An Introduction to Comparative Psychology*, London: Walter Scott, 1903, pp. 53, 59.

longer content with hearsay and general impressions. Scientists go to primary data. The historian discovers and evaluates original documents. The anthropologist observes earth strata, building materials, burial customs, and skeletal development. The economist traces costs of different items in different localities over long periods. The sociologist gathers data and statistics on crime, poverty, home conditions, and unemployment. Many of the descriptions are *qualitative*, which means that the existence or nonexistence of elements in a total situation is noted without measuring their amounts. In psychology, photographic records are more widely employed than formerly, and quantitative measures are being used more and more to describe observed phenomena. The work of Galton, Binet, and Thorndike in the field of intelligence measurement and the work with achievement tests and tests of musical talent are cases in point. Even in studying problems of personality and character, for which quantitative scales have not yet been satisfactorily developed, analyses and observations are made with greater care than formerly; questionnaires and rating scales are drawn up and interpreted with greater caution.

Experimental Control. The gathering-together of data alone is not science, even though many difficult problems are met and overcome in the process of collecting them. If properly done, it is scientific, in that it forms the basis for scientific investigation. Thus, at the present time, it is no more science to measure and plot the increasing intelligence of children up through the grades of an elementary school than it is to look at a neuron through a microscope, or measure the length of the dining room table. If the facts discovered are elusive, the process of finding them is often called research. If the conditions under which they appear are brought under *control*, so that there is but a single variable present and *predictions* concerning their subsequent appearance and activity are regularly fulfilled, we may call such research, science.

All this implies experimentation, and experimentation is really only a more careful way of trying out a hypothesis to see what will happen —step *d* in the process of problem-solving described above. The experimenter must be sure that what does happen is due to what is tried out and not to some other condition; hence all possible factors which might in any way influence the results must be rigidly controlled. In the physical sciences, these are such things as temperature, illumination, electric current, moisture, intensity, etc. In psychology not only these but other factors such as the intelligence of the subjects, socio-economic status, race, linguistic ability, physical maturity, motivation, must be controlled,

or their amount of variation measured if the results are to be at all tenable. Laboratory control as illustrated by the experiments thus far described is of course more exact, but schoolroom experimentation is more nearly representative of school conditions. And it, too, may be made quite dependable by the *control-group* technique developed in the biological sciences. In this technique, all influential factors are the same for the individuals in two groups except for one variable factor which is applied to one of them—the experimental group, but not to the other— the control group. If one of two equated groups of children is taught in one way and the other in another, if other factors are equivalent, the difference in the performance of the two groups following the training period would indicate the superiority of one method over the other. Various statistical techniques are employed to take care of the individual variations and to make sure that the differences found are reliable—that is, that they are true differences and not a consequence of chance factors or of the techniques employed.

A great deal of valuable scientific work is carried on under the name of research, much of which is aimed at the solution of local educational problems rather than the discovery of consistencies that hold more generally. Many of the advances in education have come through the informal research studies that substitute for personal impressions such data and results as may be obtained from the kind of measuring instruments that have been described in this volume. Sometimes stimulated by schools and colleges of education and sometimes by the superintendent's office, such studies are frequently made or contributed to by teachers working individually or on group projects. This kind of research has unquestioned value, not only for the insight it gives teachers into the nature of the problems that confront them, but also for the findings which are useful locally and which, when gradually brought together, constitute a body of more reliable knowledge than was formerly available, on the basis of which later educational decisions can be made.

Needless to say, large scale experimental work can be done only by those who are adequately trained, and then only at the cost of much time and money. The following-up of one hypothesis after another, improving apparatus, altering techniques, and repeating experiments to be absolutely sure of one's results—all this is hard work, but fascinating work—and the results? Well, sometimes there aren't any; and sometimes they revolutionize an industry, an institution, or a civilization.

The Scientific Attitude. There are many concomitants of the scientific attitude, but the one which transcends the rest may be called *fair-*

mindedness, impartiality, or freedom from bias. While the man of science is not without convictions, his convictions within his field of specialization are based on scientific evidence and not on authority supported only by more authority; and he is willing to relinquish his stand when new evidence makes it untenable. He is therefore a man of candor, honest with himself, with his data, and with the public. A second characteristic is *intellectual curiosity*. He is interested in nature, but never repelled by it; he wants to know what makes the wheels go round, and he is peculiarly ingenious and persevering in his attempts to find out. These two characteristics—fair-mindedness and intellectual curiosity— are recognized as desirable in any one, whether or not he has the necessary scholarly background or technical training to become a scientist.

9. Research in Educational Psychology

The Problem. While the data and techniques of research in different areas differ, the fundamental procedures are essentially the same. There are many technical problems in the field of education which the educational psychologist more than anyone else is prepared to attack. Thus far in this volume some of the more outstanding achievements have been traced. More and more research work is being done every day in the schools, both by special bureaus and by the teachers themselves. The methods of educational research involve the various procedures that are most effective in solving educational problems. It is particularly difficult for an inexperienced student to select a problem for research because he has not had occasion to meet the actual difficulties that give rise to problems, because he doesn't see them when they may be right in front of him, or because he knows no way to attack them since he is unacquainted with many of the scientific techniques that might be employed.

However, when a choice of problems presents itself, certain criteria may be suggested: (1) Interest and knowledge of the would-be investigator. (2) Value. This may be theoretical, serving to satisfy the desire to know or find out something, and, if so, the problem may be designated as one in pure science—though later work may show it to have great practical significance. Or it may be one which aims at some actual difficulty or danger, such as the corn borer in agriculture or the delinquent in the field of education. (3) Originality. Has it already been solved by someone else? This suggests the need for wide acquaintance with one's field. (4) Practicability. Have the proper techniques been developed, and is a solution within the investigator's resources of time and money?

Then comes the task of *delimitation,* for the enthusiasm of the researcher is quite apt to suggest a problem which is in reality made up of a number of lesser problems, each one of which would occupy a lifetime. The main problem, therefore, is analyzed into a number of lesser parts, one of which is selected according to the criteria above. Thus "maladjustment in schools" may be broken up into such factors as emotional instability, sensory defect, intelligence, home influence, delinquency, dishonesty, school influences, etc., with the final outcome a study with the title: "The Relation of Intelligence to Cheating in High-School Algebra Examinations," or "The Validity of the X Test of Ethical Discrimination," or "Pupil Elimination and Parental Income."

The investigator may just seek to find out some of the facts in the case and consider their implications. Or he may have a definite hunch or hypothesis as to causes and relationships so he will design his research in such a way that, if he gets one set of results, the hypothesis will be shown to be true, whereas, if he gets other results, the hypothesis will be false. His problem then is to discover the facts or to determine the truth or falsity of a certain interpretation.

Bibliography. The problem chosen is likely to be one that has at least been noted before. It is therefore essential that the investigator look up all available references to it to obtain any further ideas and to discover what studies have already been made. He may discover that his problem has already been solved, or at least that someone has previously used the technique he was planning to employ. If not, he will take up the problem where previous workers left it. And, out of respect to his readers, he will cite the references and indicate just how his contribution differs from what has gone before.

Technique. In prosecuting his research he will make an accurate survey to determine prevailing conditions; or he will set up an experiment to discover the effect of one of the variables operating in a complex situation.[17] In either case or both, he must employ certain techniques, such as measurement, case study, documentary analysis, and statistics. Each one of these involves the use of procedures requiring special knowledge and skill. For his readers, and for future investigators in the same field, he must describe the methods and materials employed with meticulous care so that other workers may repeat his experiments or otherwise verify his results.

[17] See, for example, C. V. Good, A. S. Barr, and D. E. Scates, *The Methodology of Educational Research,* New York: Appleton-Century-Crofts, 1941 (revised).

Data. Research technique is a device for obtaining or manipulating data. The investigator employs what are referred to as *primary source materials*—original manuscripts, actual artifacts, test results, and the like. He is not especially concerned with so-called *secondary sources*, that is, second-hand accounts of what others have observed and written about. He will check the reports of other researches, of course. But textbooks, magazine articles, and newspaper accounts are for beginners, workers in related fields, or general readers and lay persons. He will present his data succinctly in an orderly fashion, using pictures, diagrams, tables, graphs, or numbers which reveal the facts and relationships he is desirous of pointing out, and his exposition will explain the significance of the facts he thus presents.

Results and Conclusions. His findings which have been presented in detail may be summarized at the close of his report as the *results* of the research. The *conclusions* are the inferences that may be drawn from the results, the generalizations that the investigator considers may be made inductively from the findings. Or they may be the deductions that may be derived from the generalizations, and that may have implications for similar specific situations.

Interpretation. From the consumer angle, a piece of research may not seem so valuable as it does to the producer. Before he accepts the results as generally applicable, the critical reader will wish to note whether the techniques employed are adequate and the inferences sound. Specifically: (1) Is there a *sampling error?* That is, were enough subjects employed, and were they typical of the group studied? (2) Were the scoring and computations accurate? (3) Was standardized material used, and, if so, were the norms representative? (4) Were the variables adequately controlled by means of the control group or some other accepted method? (5) Do the conclusions follow from the results; are there logical or other fallacies in the reasoning employed? (6) Are the results applicable to specific classroom situations?

In Summary

When an individual finds that he doesn't know which parts of a situation to respond to, or what response to make to the parts he thinks he should respond to, he is confronted with a problem. Fortunately, or unfortunately, such a predicament is relatively common; and, although the specific things one has learned, the previous connections that have been rewarded, prove a useful means to the end, they are not the solu-

tion. One has to choose between the responses one has learned to connect with individual parts of the situation (e.g., the sound of a diphthong that is the same as that of one of its component letters); or he has to find new and different responses called for by the relationships that exist among certain parts (e.g., the sound of a diphthong that is different from that of either of its component letters).

Pseudo-solutions of frustration and authority, of anecdotal lore and chance, are passed over in favor of the more rational thought processes. Problem-solving consists first of structuring the situation, of getting an overview of related parts, as one does with a map or a social survey, in order to find what is there, being careful not to exclude relevant aspects such as precedents and personalities, and endeavoring to focus on what seems to be the locus of the difficulty.

Then, somehow, the parts have to be restructured, to be seen in some new and different relationships, an experience that is referred to as insight, through a reversal of figure and ground, the appearance of different similarities or proximities (Chapter X), or the introduction of new and appropriate parts that may previously have been fixed in other structures or patterns. There may be such restructurings derived analogously from experience that may or may not provide the solution sought. Sometimes it is evident at once that a solution is correct, while in other cases it may take days or weeks of careful investigation to find out, from a study of the consequences. And, in the case of some life problems, one may never be quite sure that another choice might not have been a better one.

To find out what people mean constitutes a special type of problem. Do they "mean what they say" or something else? Children are presented with many such problems because of their inexperience with things and words, and a teacher may think a child doesn't know the answer to a question when he is trying to puzzle out what some of the words mean, perhaps arriving at some definitely wrong conclusions. The verbal categories which are used to classify different forms of behavior often determine the kind of treatment people receive; the correctness of the treatment, it may be postulated, is determined not on the basis of stereotypes or the intricacies of grammar and semantics, but rather on that of the promotion of human values.

There are a number of maxims for correct thinking which, if followed, would insure, if not infallibility, at least a smaller amount of fallacious thinking. These should not so much be taught as practiced in school work. They are fundamental no less to the daily solution of life problems than they are to the informal research studies carried on by students

and teachers, and to the more precise controlled experiments of the scientific laboratories.

Questions

1. Give illustrations of the loose, inexact use of words; of vague usage aimed to obscure meanings and create attitudes.
2. Give logical definitions of the technical terms in this chapter.
3. Illustrate reification, personification, and deification of abstractions.
4. How can children's concepts used in the subject or grade you are planning to teach be enlarged?
5. What is the meaning of the saying: "It all depends on the way you look at it?"
6. How can you tell whether a statement is true, or a planned course of action is wise?
7. What differences are there between the solution of a life problem and the method of science? What similarities?
8. In what ways can high-school courses in social or natural science reduce the amount of fallacious thinking?
9. List a number of problems which might confront (*a*) a college freshman, (*b*) a college senior, (*c*) a beginning teacher. What possible solutions to one of them present themselves? How does one know whether they are the correct solutions or not?
10. Show how some problem in learning, which so far as you know has not been attacked scientifically, might be so attacked, giving the materials, method, and possible results and conclusions.
11. Look up some experimental study in the field of educational psychology and criticize its techniques.
12. Discuss the importance of the contributions of science to the present Western civilization. Where has science thus far failed?
13. Are physics and chemistry "more scientific" than psychology? What are the implications of your answer?
14. Will learning the rules of logical thinking enable one to think more correctly? What can be done about it?

Readings

Barry, F. *The Scientific Habit of Thought*. New York: Columbia University Press, 1927.
  A scholarly volume.
Cameron, E. W. *Viewpoints in Educational Psychology*. New York: Century, 1930.

Dewey's analysis of a complete act of thought and a brief discussion of problem-solving by Swift are found in Chapter XII.

Cassirer, E. *Language and Myth*. New York: Harper, 1946.
A philosophical essay that reveals a little of the word magic that is responsible for the nature of our concepts.

Columbia Associates in Philosophy. *Introduction to Reflective Thinking*. Boston: Houghton Mifflin, 1923.
The operation of the thought processes in various professional fields.

Dimnet, E. *The Art of Thinking*. New York: Simon and Schuster, 1928.
A lucid exposition of the thought processes with a literary flavor.

Garrett, H. E. *Great Experiments in Psychology*. (Rev. ed.) New York: Century, 1941.
Chapter XII describes the experiments of Köhler on chimpanzees.

Koffka, K. *Principles of Gestalt Psychology*. New York: Harcourt, 1935.
A detailed elaboration by one of the masters.

Köhler, W. *Gestalt Psychology*. New York: Liveright, 1929.
A simple exposition by one of the masters.

Köhler, W. *The Mentality of Apes*. New York: Harcourt, 1925.
Description of the famous gestalt experiments on the problem-solving of chimpanzees.

National Society for the Study of Education, Forty-ninth Yearbook, Part II. *Learning and Instruction*. Chicago: University of Chicago Press, 1950.
Chapter IV on learning information, concepts and generalizations, and Chapter VIII on principles and techniques of problem-solving.

National Society for the Study of Education, Forty-first Yearbook, Part II. *The Psychology of Learning*. Bloomington (Ill.): Public School Publishing Company, 1942.
Chapter XI on language and meaning and Chapter XII on problem-solving.

Powers, F. F., T. R. McConnell, and others. *Psychology in Everyday Living*. Boston: Heath, 1938.
Chapter XVII is on problem-solving and creative learning.

Robinson, J. H. *The Mind in the Making*. New York: Harper, 1921.
Shows the relationships between rationalization and rational thought.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.
Aspects of problem-solving are described (pp. 290–314), and the solution of problems in various school subjects is discussed (pp. 341–350).

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

Scientific methods used in psychology (pp. 28–58); gestalt and purposive principles of learning (pp. 398–413); Dewey's analysis of an act of thought (pp. 622–624); and experiments in thinking by Ruger, Köhler, and Piaget (pp. 628–644).

Sorenson, H. *Psychology in Education.* New York: McGraw-Hill, 1948.
Chapter XVIII is on the activity and project method in teaching.

Trow, W. C. *Scientific Method in Education.* Boston: Houghton Mifflin, 1925.
An introduction to the meaning of scientific method and its bearing on educational problems.

Werner, H. *Comparative Psychology of Mental Development.* New York: Harper, 1940.
A fascinating, scholarly volume comparing the mental processes of primitive man, the child, and the psychopath revealing striking parallels with those who in one way or another escape these categories.

Wrightstone, J. W. *Appraisal of Newer Practices in Selected Public Schools.* New York: Teachers College, Columbia University, 1935.
Newer methods aimed in part to develop problem-solving abilities.

The Availability of Past Experience

Learning and Retention. Past experiences as they may have been perceived, associated, and thought about, are fortunately available for use on later occasions. Sometimes they are hardly available at all, as when we try unsuccessfully to recall a name or remember a joke or anecdote. At other times, they determine our behavior almost entirely, as in routine automatized acts. They may guide us in a successful performance, and they may throw us completely off the track, by producing the wrong approach to a particular situation. But whether they are effective or not, it is generally agreed that past experiences leave some kind of trace in the nervous system which influences later responses, whether the responses are primarily motor coordinations or memories; that is, some sort of verbal or imaginal representation of what has transpired.

Obviously, the process of learning is one in which particular experiences are acquired which will presumably be of value later. It is therefore incumbent on teachers and learners not only to select the experiences with care, but also somehow to make each experience such that it will be effective when the time comes to use it. Things learned and then forgotten immediately after the final examination, or before, or things only partly or wrongly learned, or things learned but in a form in which they cannot be used when the need arises, might as a rule just as well be omitted from the curriculum. True, such items could be relearned more rapidly than they were learned in the first place. But if it is likely that the individual might later profit from the experience, every effort should be made to have it learned in such a way that it will be available when needed. It should be available either when a specific situation recurs, that is, be remembered, or when a similar situation presents itself, which

means that it should transfer to those situations in which its use would be appropriate.

A great deal of thought and experimentation has gone into the problem of the availability of past experience. Whether classified as memory or transfer, the implications are naturally of real concern both to teachers and to learners.

1. Immediate and Delayed Recall

Memory Span. Perhaps the simplest memory experiments are those of immediate recall. So fundamental are the processes involved that they appear, for example, on the Stanford-Binet Intelligence Examination. One method of presentation is to pronounce a series of digits in a uniform tone at regular intervals of about one per second. When the series is completed, the subject tries to repeat the same items. The number of such items that he can repeat correctly determines his memory span. The average is usually five digits at the age of seven, and nine at maturity, some individuals being able to repeat as many as twelve or more.

One can repeat about as many unconnected words as digits, while many more words can be repeated if they are in the form of sentences. The items may be presented orally, or visually with an exposure apparatus. The number the subject can recall perfectly may be the score, or the percentage correct of a larger number.

Perhaps the most important conclusion for educators from these experiments relates not to sex differences, which are negligible, nor to the effect of training upon improvement of the function, which is considerable, nor yet to the well-nigh complete failure to remember disconnected digits or words after a few hours or days. More important than all these is the continuous increase of ability in this function through the years of childhood and adolescence. The average performance for each age is uniformly higher than that of the preceding, which emphasizes the maturation factor and serves as a kind of indicator of the stage of development.

Another form of test of memory span for serial impressions is similar but differs from it in that meaningful material is employed—a sentence or paragraph. In this, the ideas rather than the exact words are to be repeated. A number of paragraphs have been so used.[1] The chief value of this kind of test of memory lies in the fact that the task is common to the experience of every one—far more so than that of verbatim repetition. We find this also considered of sufficient importance to be incor-

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[1] G. M. Whipple, *Manual of Mental and Physical Tests*, Baltimore: Warwick and York, *I. Simple Processes*, 1914; *II. Complex Processes*, 1915, Test 39, 205–221.

porated in the Stanford Revision of the Binet Scale, in which, in some cases, specific questions are asked about the paragraph, while in others the persons being tested are asked to repeat as much of it as they can.

A paragraph entitled "The Marble Statue" was read to 2,730 persons ranging from eight years of age to maturity. Steady improvement with age was again found, up until the thirteenth or fourteenth year, with the odds decidedly in favor of adult performance (Table 14).

TABLE 14 *The Marble Statue Test; Scores By Age and Sex*[2]

Sex	Age	8	9	10	11	12	13	14	15	16	17	18	Adult
Male	No. of Cases	102	148	142	149	156	163	129	89	60	45	32	65
	Aver.	24.3	28.7	30.0	32.9	35.1	36.8	36.1	35.5	34.4	34.6	36.9	38.3
	A.D.	6.7	9.1	6.7	5.6	7.4	6.3	7.0	6.7	5.6	8.7	6.0	7.0
Female	No. of Cases	89	158	138	156	191	164	146	99	94	81	48	86
	Aver.	28.5	31.0	33.5	36.4	38.1	38.5	39.0	39.1	37.3	36.6	37.8	40.1
	A.D.	11.3	9.4	6.8	7.7	7.2	7.1	7.5	6.3	5.1	6.9	4.4	5.9

Other studies show that there are great individual differences, that those who retain the most at first are also the best after intervals of different lengths, and that the correlation between performance and school success is low. These last two conclusions offer consolation both to the rapid and to the slow learners: for the rapid, "easy come, easy go" is a false doctrine; and for the slow, good scholarship is possible with perseverance.

Symbol Substitution. The substitution test calls for the transposition of digits or other symbols according to a key to which the subjects may refer during the process of taking the test. For example, the key may show that a 1 is to be placed under each dot, a 2 under each colon, and so on, in several rows of such symbols. When the key is short and therefore quickly learned, the exercise is one in which skill of a sensorimotor nature is effective. When, however, the key is long, demanding constant reference to it, actual speed of transcribing is of less importance than remembering the symbols to be transcribed.

[2] W. H. Pyle, *The Psychology of Learning*, Baltimore: Warwick and York, 1928, Table 7, p. 147.

With a nine-symbol test, optimum performance as measured either by the number of digits written per thirty-second period or by average speed in seconds for each five lines is usually reached in the fourth or fifth trial; while, with twenty-six substitutions, subjects did not approach their limit until the twelfth or, more often, the seventeenth five-minute practice period.

The processes involved in this test resemble the acquisition of a foreign vocabulary. Some time ago one experimenter presented lists of from thirty to fifty unfamiliar German and French words and their meanings, one list to be committed to memory daily.[3] This took from thirty to forty minutes at first, but during the course of two or three weeks the time was reduced nearly half. One subject whose case is typical learned, for the time being at least, in six and a half hours more than a thousand new words—as many as he might be expected to learn in a university course in a year.

Simultaneous Exposure. Another scheme for measuring immediate recall is that described by Kipling in his famous Indian story, *Kim,* in which the subject is allowed to view simultaneously for a short period of time (a few seconds) a number of different syllables, or words, or objects on a tray or in a store window, and then see how many of them he can name successfully. This technique is somewhat difficult to standardize, but it is modified sometimes by using the method of interrogatory recall. The subjects are asked if they saw certain articles which may or may not have been displayed. Their many failures to answer correctly throw considerable doubt on the dependability of the eye-witness report of events in criminal trials.

Forgetting. But series of digits or words that can be recalled at once, as well as symbols substituted or discrete items observed simultaneously, are soon forgotten. After a few minutes or hours or days, they have disappeared from memory. Perhaps the occasion can be recalled, perhaps a few items, but little more.

The phenomenon of forgetting hardly needs to be demonstrated, for it is unfortunately quite familiar to all. But how and why it occurs is difficult to determine. Supposedly the impressions gradually *fade* out through disuse though exactly what occurs in the cortical neurons is not known, especially since some memories last for a very long time. Some incidents of childhood, for example, can be recalled with considerable clarity and detail. This fact has led psychoanalysts to substitute for

[3] W. F. Dearborn, "Experiments in Learning," *Journal of Educational Psychology*, vol. 1 (September, 1910), 373–388.

fading a theory of *repression*. Those things are forgotten, they claim, which the patient wants to forget because they are unpleasant for one reason or another. But they are not actually forgotten. They are repressed and remain in the unconscious, often actively responsible for the patient's thoughts and acts, but yet not accessible to the patient except through the skillful use of the psychoanalytical technique or perhaps through hypnosis.

There is a great deal of clinical evidence to support this theory. But it does not seem very applicable to the general run of experiences in the lifetime of the individual. Psychologists have explored the early memories of subjects, asking them to indicate whether their several recollections are pleasant to them or unpleasant, and have found no decisive majority in either category, though such recollections admittedly have not been repressed if they can be easily recalled. Similarly, the general run of numbers, words, and ideas that are remembered or forgotten would be difficult to categorize as pleasant or unpleasant. Instead, the explanation seems to be more mechanical. Some later activities tend to block or interfere with what has been learned, which, as a consequence, is forgotten, though it may be recalled later under different circumstances. This blocking is referred to as *inhibition*.

The term *retroactive inhibition* refers to the forgetting or decreased retention of material earlier learned as a result of activities (usually learning something else) intervening between the original learning and the later attempt to recall. Thus if one learns some word meanings or number combinations in the morning, and some more in the afternoon, and tries the next day to remember the ones learned in the morning, those learned in the afternoon will get in the way. Fewer of the morning ones will be recalled than would have been if there had been no afternoon session. Furthermore, it will be harder to learn the ones in the afternoon because of the previous morning session. This latter phenomenon, the slower learning of the second series, is referred to as *proactive inhibition*.

Although the experimental work defining and measuring these inhibitory effects has been done in the laboratory, often with nonsense syllables or other units equally useless educationally, the facts discovered are of considerable importance in teaching.

The emphasis on inhibition resulting from the order of presentation is likely to obscure the more obvious fact that, in various kinds of meaningful situations, prior learning may facilitate later learning and improve recall. This is particularly true when the earlier learning provides familiarity with a structure or pattern of thought that may be used later, or when it opens up ways of approach to the later learning situa-

tion.[4] Thus in geography, for example, a general survey or orientation of a country on Monday may provide a structure for Tuesday's learning of more specific things about it, e.g., the location of the chief cities, its products, trade routes, and so on.

It is more than probable that the seeming "stupidity" of pupils who forget what they have so recently learned, or seem unable to learn new material readily, is not stupidity at all. Instead, it may well be that the materials are taken up in such a way that these inhibitory processes cannot fail to operate. True, a certain amount of care is sometimes exercised, as, for example, when pupils are not allowed to start two foreign languages at the same time. But it is quite likely that the material studied in one subject interferes with learning in another, instead of helping it. And in one school subject, forms and details in one lesson proactively inhibit learning in the next. When the next lesson is taken up, the time spent on it retroactively inhibits recall of what was learned in the first. Extreme caution should therefore be exercised in avoiding these confusions so far as possible by interposing different kinds of material, or by more thorough learning.

What may be called a special form of retroactive inhibition is what is termed *associative inhibition*. If two stimuli are associated (A and B), it is more difficult later to learn to associate one of them with another stimulus (A and C). And furthermore, when the second (A and C) has been learned, the subject is less likely to be able to recall the first (A and B) than he would have been if he had not later learned the second. This is called *reproductive inhibition*.

Thus 5×8 will be harder to learn if 4×8 was learned first; and when 5×8 is learned, 4×8 may be forgotten. Of course, these conditions can be demonstrated only when the learning units and learning periods are equivalent and when other associations and meanings are fairly constant and held to a minimum. But they operate with sufficient regularity to suggest that unless special care is exercised, teachers will be employing methods that help pupils to forget.

2. INCREASING RETENTION

The Curve of Forgetting. Whatever may be the causes of forgetting, whether fading, repression, or inhibition, or all three, under controlled conditions it tends to follow a definite course. The pioneer studies that charted this course were those made by Hermann Ebbinghaus (1850–1909). He served as his own subject, and though his studies were pub-

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[4] G. Katona, "The Rule of Order of Presentation in Learning," *American Journal of Psychology*, vol. 55 (July, 1942), 328–353.

lished as long ago as 1885, they were so painstaking and thorough that they still stand as classics in this field. His greatest innovation was the use of so-called *nonsense syllables*. These are vocables made by placing a vowel sound between two consonants—*jav, bex, kib, mod, ruj,* and so on. He found that there are approximately 2300 such syllables in German, and for his learning exercises he selected at random from the total list. While "logical" associations are possible even with such meaningless sounds, so that even these are not equally difficult to learn, nevertheless such patterns are less easily formed and the units are relatively simple and homogeneous. They therefore furnish far more exact units than such other materials as have been described.

Furthermore, he standardized his method of learning, so that repetitions produced constant results, by reading a list through from beginning to end at a uniform rate and keeping all the conditions as carefully controlled as possible. He evolved the so-called *saving method* to measure the amount forgotten; for he demonstrated that, though only a small portion or perhaps none at all may be recalled, it takes less time and fewer repetitions to relearn than were necessary at first. Hence the time saved, i.e., the difference between the first learning time and the relearning time, is a measure of the amount forgotten; if this difference is large, little has been forgotten; if small, a great deal.

Let us suppose a person has learned a series well enough to make two successive correct recitations. How much will he recall after a day or a week or a month has elapsed? Table 15 shows the process of deteriora-

TABLE 15   *The Process of Forgetting*

(After Ebbinghaus)

Interval between learning and relearning	Per cent of the learning time saved in relearning
15 min.	58.2
1 hr.	44.2
8.8 hrs.	35.8
24 hrs.	33.7
48 hrs.	27.8
6 days	25.4
31 days	21.1

tion. More than half is gone in an hour and two-thirds in a day, while after that the loss is more gradual. The rapid loss right at first has also

been found by other investigators, using other materials, as shown in Figure 67. It suggests very pointedly the need for drills shortly after the original learning, perhaps the same day and certainly by the next, if anything approaching permanence of retention is desired.
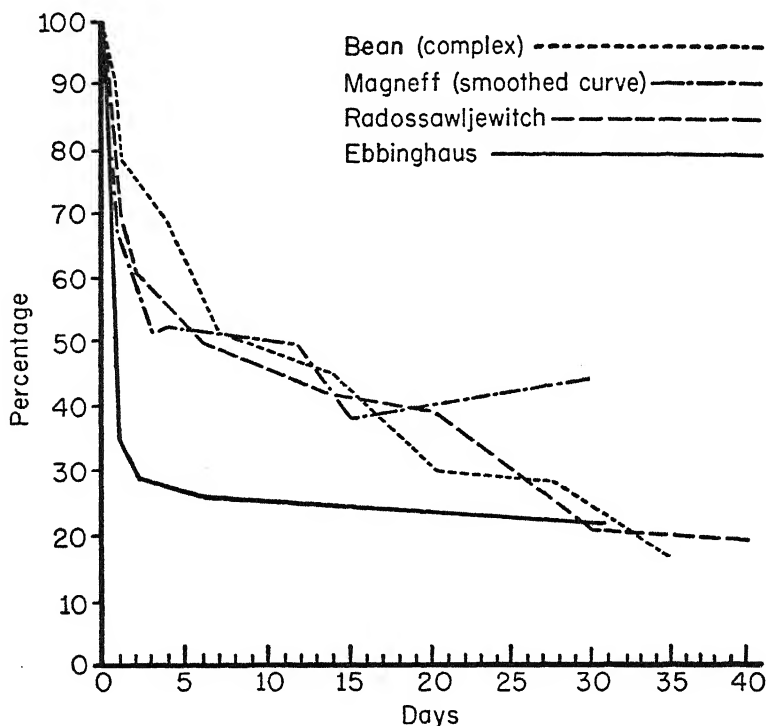
Figure 67. Curves of Forgetting Ebbinghaus and Radossawljewitch used nonsense syllables; Bean, letters; and Magneff, poetry. (From D. Starch, *Educational Psychology*, New York: Macmillan, 1928, Fig. 47, p. 171.)

Distributed Repetitions. But much is retained of a series that cannot be recalled. On each successive day, the number of repetitions necessary for the committing of a given series is less than on the preceding day (Table 16). Thus each day about twice as many repetitions are necessary as will be needed the next day.

The effect of interval has been studied by subsequent investigators, as has an incidental conclusion that the data afforded. Ebbinghaus reported that "for the relearning of a twelve-syllable series at a definite time . . . thirty-eight repetitions, distributed in a certain way over the

three preceding days, has just as favorable an effect as sixty-eight repetitions made on the day just previous. . . . It makes the assumption probable that a suitable distribution of them over a space of time is decidedly more advantageous than the massing of them at a single time." This

TABLE 16   *Number of Repetitions Saved on Learning a Series on the Following Day; Average Values*

(After Ebbinghaus)

Number of syllables in one series	Days				
	1st to 2d	2d to 3d	3d to 4th	4th to 5th	5th to 6th
12	5.5	3.5	2.5	2.0	0.5
24	21.5	10.0	5.0	3.0	1.0
36	32.0	12.0	3.5	3.0	1.0
One stanze of *Don Juan*	4.0	2.0	1.25	.05	. . .

is the first enunciation of the principle of the superiority of *distributed* over *massed repetitions* on the basis of scientific data. Other experiments have verified it, not only with verbal memory tests but also by means of other kinds of experiments.

Overlearning. In one series of experiments, Ebbinghaus learned six sixteen-syllable series in 1270 seconds, an average based on fifty-three such tests. (See the first number in the second column of Table 17.) He then learned other such series of sixteen syllables and repeated them eight times after they had been learned, and then relearned them twenty-four hours later. The average of ten such performances is 1167 seconds, or 103 seconds less than the 1270 seconds that would have been required to learn them in the first place. He then did the same thing with sixteen, twenty-four, thirty-two, etc., repetitions and found the extent to which such overlearning reduces the time needed for recall a day later (Table 17).

The principle of overlearning, so laboriously established, does not mean learning more than is necessary; it means repeating what one has already learned several more times for the sake of greater permanence of retention. It is therefore a supplement to the principle of exercise, and is of great importance in education. Children may be able to recite their multiplication combinations, their important dates in history, or

their foreign language vocabulary perfectly on one day; but on the next, unless they have drilled over and over on it, much of it will be gone; and a week or a month later, if they have not reviewed it, nothing but a trace will remain. One can almost predict how long it will be

TABLE **17** *The Effect of Overlearning As Shown by the Saving Method*

(After Ebbinghaus)

Number of repetitions in studying	Number of seconds taken to memorize each series 24 hours later	Number of seconds "saved"
0	1270	
8	1167	103
16	1087	192
24	975	295
32	863	407
42	697	573
53	585	685
64	454	816

remembered if he knows how thoroughly it is overlearned. Hence, if it is desirable that it be remembered for some time, proper steps must be taken to insure a sufficient number of repetitions during the original learning period, as well as at proper intervals thereafter. Later experiments have served to confirm the pioneer work in the field and to elaborate the details of the serial learning of nonsense syllables. Though the meaningful character of most school learning fortunately reduces the amount of repetition necessary for retention, the overlearning method is still often a needed help in remembering.

Set. Another important factor in retention is set or motivation. This factor was controlled by Ebbinghaus in that he supposedly had the same intent to learn in all experiments. When this intent to learn is absent, repetition has little or no effect. As was noted earlier, one experimenter reported that he dictated a series of nonsense syllables to several subjects, all of whom learned it; but, when he was through, he could not repeat the series himself. He was intent on reading the syllables correctly and at the proper interval, and recording replies, and hadn't tried to learn them. The old-time method of having pupils write many times

what it is desired that they remember, perhaps as a punishment, even aside from the undesirable emotional conditioning, would seem to be quite ineffective unless the pupils really want to learn.

Moreover, the set is important at the time of recall. An unexpected demand for information, or lack of motivation when it is called for, is likely to inhibit recall. Sometimes, too, one gets a wrong lead, as when one is suddenly asked if he remembers a certain person. It may be that he knew him in school, but he has been working with some of his professional associates and thinks of these without recalling his school associations at all. This is the factor that Herbart dealt with through the instructional step he called "preparation," that is, preparing the pupils' minds to think about (and recall) certain classes of events.

Grouping. Retention is definitely affected, likewise, by the grouping of the items that are to be remembered. Even with digits or nonsense syllables, if the items are learned in groups of two or three, more of them are more likely to be retained. Subjects sometimes accent alternate items, or tie them together in some kind of word-like wholes to improve their recall. For example "sab, goz" in a series might be remembered as "sad goose," or "mod, kib" as "model kid," though they are pronounced and spelled correctly. These illustrations from the experimental situation reveal the tendency to group items, but the form of grouping may be quite varied in more normal situations.

One form has been described in connection with the discussion of associative learning by the term *belonging.* Items which seem to belong together constitute a kind of group which renders the recall of one or more of them more complete, whereas items experienced contiguously but which do not "belong" may not be recalled.

Another form of grouping, of an artificial sort, is to be found in the so-called *mnemonic devices.* These may take the form of a verse, like "Thirty days hath September . . ." or, "I before E, except after C. . . ." Students have employed schemes to remember such diverse items as the names of the presidents of the United States and of the cranial nerves, recalling them by a sentence, the initial letters of each word of which are the initials of the names of the items. More complicated devices have been developed and commercialized, one of which, for example, requires that the innocent customer memorize a list of names of a hundred familiar objects, associating each with the next; then any items that he wishes to remember can be similarly associated with these objects in order. The system depends primarily on visualization, but the valuable thing about it is that it emphasizes the fact that

one way to improve retention is to improve the previous process of learning.

Logical Systems. Instead of the artificial mnemonic devices, however, it is far more satisfactory when possible to group items in logical categories. The basic logical relationships, which were worked out by Aristotle and called *predicables,* have been elaborated by logicians since his day. There are five predicables: species, genus, differentia, proprium, and accidens.

The Logical Definition. The first three predicables constitute what is known as the logical definition:

1. *Species: What* is it? What is its name? Example: man.
2. *Genus: To what class* does it belong? Example: animal.
   What other things belong in the same group? Example: ape, dog, etc.
   What things belong in sub-classifications? Examples are shown in the plan below:

Animal
- Man — Caucasian, Mongolian, etc.
- Ape — Gorilla, Chimpanzee, etc.
- Dog — Spaniel, Hound, etc.

3. *Differentia: How does it differ* from things in the same class? Example: rational.

The logical definition is thus seen to be a classification device in which the term to be defined is placed in the class or larger group to which it belongs and then differentiated from the other members of that group, thus:

Species		*Differentia*	*Genus*
Man	is a	rational	animal

Here, the genus is "animal," the next larger class to which man belongs; and "rational" serves to differentiate him from the other creatures in that class, the apes and dogs, for example. An old story reveals the fact that logical correctness is not enough in a definition. According to the story, a philosopher defined man as "a biped without feathers," and the next day he found on his desk a picked chicken!

The same parts are seen in the following definitions:

Clay is fine sand mixed with water.
Psychology is the science of behavior.
A definition is a proposition declaratory of the meaning of a word.

There are, of course, other ways to define a word. It is often sufficient to give a more familiar synonymous word instead of a logical definition, especially when one of several meanings is to be indicated, as "automobile" for "car"; "corpse" for "body"; or "average" for "mean." Sometimes a list of its attributes may be given, thus: Man is everything which possesses corporeity, organization, life, rationality, and certain peculiarities of external form.

It may be proper to digress a moment at this point to mention some of the relationships of the logical definition to child development and to the art of teaching. The definition of words in terms of use, while indicating that the child possesses some knowledge of meaning, is nevertheless an indicator of a lower level of development than one which reveals a comprehension of genus and differentia. A thing is what it is no matter what it is used for. It was pointed out in classical times, for example, that "clay" should be defined as it is above and not as "something to lay between bricks." An evidence of a maturing mind is its ability to separate concepts from their usual concomitants, which frees them for use in new relationships.

When a student for the first time meets concepts like "parallel," "quadrant," "dynasty," "modal auxiliary," or "strophe," and must somehow familiarize himself with such new terminology, difficulties present themselves at once. It is the great temptation of the teacher to furnish logical definitions first and then assume that if the pupil has learned these by heart he knows the meaning of the terms. Some of the older high-school algebra books began with several pages of definitions which supposedly enabled the pupil to understand what followed; at least it sounds reasonable to put it the other way around and say that the children could not understand without knowing the meanings of the terms used. But, unfortunately, the ability to parrot definitions does not of necessity carry with it any understanding of the words defined. Many teachers therefore find it advisable to use the logical definition at the end, to sum up an explanation, after the term has been pointed out in its concomitant variations as described in the chapter on perception. If the definition is then learned, the meaning will probably be retained longer, and the terms will be employed more accurately.

In the older natural sciences, most of the technical terminology is

exact and a matter of common agreement. In the social sciences, the slip-shod usage of common speech still militates against such desirable precision. The physicists' definition of gravity is beyond the orbit of the man in the street; but it is a different matter with "instinct," "habit," "intelligence," and "consciousness." As a consequence, the student is apt to be vainly searching for the "correct" definition of these terms instead of turning his attention to the varying phenomena, one aspect or another of which the same word is often used to designate. For this reason, an author is privileged to select some one of these meanings and apply the dubious term to it; and, if he does so consistently, he is quite justified.

Proprium and Accidens. The remaining two predicables refer to cause-and-effect and to chance relationships of objects and events in whatever area of subject matter one may be interested:

4. *Proprium: Why?* How does it follow? How can it be demonstrated? What is the cause? The effect?
5. *Accidens:* Temporal—*When* did it happen? What happened before and after?
   Spatial—*Where* is it? Where does it (he) live? What is near by? How does one get there?
   Structural—*What* is its (his) appearance? What are its (his) characteristics? Who was involved?
   Functional—*How?* What does it (he) do? How is it used? What is it for?

The essential designations, genus, species, and differentia, along with those of proprium and accidens, are to be viewed as the context in which the thing is known or experienced. "Proprium" serves to call to mind the reasons in support of a proposition whether it is in geometry or in debate. It suggests a search for earlier events known as *causes,* the occurrence of which was necessary if certain subsequent events were to take place, and in the absence of which they could not have occurred, whether they are military campaigns, diplomatic *coups d'état,* imperial ukases, or mechanical inventions.

"Accidens" may call to mind varying accidental attributes of a thing having no necessary connection with it. The cause-and-effect relation is sometimes present or it may be quite absent in a *when* or *temporal* sequence. But, whether one is studying the Old Testament, the Renaissance, the biography of Napoleon, the novel, or the child, the day-to-day or year-to-year succession of events is important, and, once appreciated, is an aid in remembering.

The same is true of the *where* or spatial relationships, whether in anatomy, geography, or history, whether one is interested in the habitat of a frog or the milieu of a poet.

"What does it look like?", "What is it made of?" are common questions relating to the *what* or *structural* organization of objects. We have seen that the visual education movement is helping to give body to children's ideas of the structure, the relationships, of parts of the world, and of the phenomena of science and of mechanical inventions. Similarly, a careful observation of words makes correct spelling easier, and a recognition of similarities in words hastens the mastery of a foreign vocabulary. A student may not have to look up "zusammen-setzen" in the dictionary: he will see "place together" in it, but if he knows his Latin he may also see "compose."

And, lastly, one may ask, "How is it or how can it be used?" The *how* or *functional* significance is important—whether the "it" is electricity or a vacuum tube, a horse or an airplane; a recommendation or a congressional empowering act.

Proprium and accidens serve to point up logical relationships that may be noted while learning. They help the learner to form meaningful groups of items that belong together, and thus facilitate recall. When it is desired to recall items, if one asks himself when?, where?, what? (who?), and how?, he will often remember some of these items that have been learned in this way which he would otherwise not be able to recall.

Grouping According to a Principle. A special case of grouping occurs when the items are so arranged that they conform to a certain principle of regularity.[5] For example, the following digits might be grouped in this way:

149	162	536	496	481

or they might be grouped,

1	4	9	16	25	36 . . . ,

in which case, those who recognized the squares of successive numbers could remember them more easily and would be able to continue the series. Previous learning is brought to bear which, if the situation is recognized, if the system is remembered, and if it is recalled when needed, will enable the subject to reproduce the series correctly. What occurs, however, would seem to be this: The subject does not remember the series any better; he remembers two other things—the relationship (squares) and a correlate (start with 1), and he educes the next

[5] G. Katona, *Organizing and Memorizing*, New York: Columbia University, 1940.

(4), and by a similar process the next (9), and so on. So what seems to be a feat of memory turns out to be a simple case of the education of correlates.

If he tries to remember another series the same way, the system will not work, e.g.,

<div align="center">

154   871   110   141   317

</div>

He must discover the new principle, if any. Here he may see that he needs alternately to add 4 and subtract 1:

<div align="center">

1   5,4   8,7   11,10   14,13   17

</div>

So long as there is only one principle (or relatively few) operating, he can "remember" the series easily. But with a large number of principles, any one of which might be used, his "memory" problem becomes one either of trying to recall one principle after another to try out (for which there may be little time), or of trying to educe the relationship from the correlates, i.e., the successive numbers. His problem is one of a "number series completion," like those on intelligence tests.

What has been said, however, does not detract from the value of a logical system of grouping of some sort, if one can be found. The same can be said not only of numerical relations, but of spatial and other relations as well. In the match trick, used in the same study as the number series, one way to "remember" is to memorize the correct moves. The problem is to change the places of three matches and so place them as to form four squares of the same size instead of five:
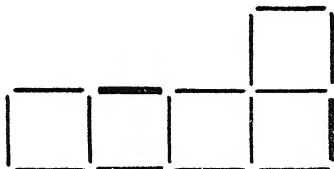
The trick can be done in a number of different ways, the following being one:
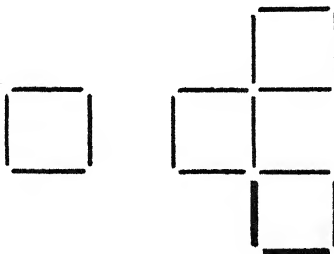
The heavy lines show the positions of the three matches that are moved. However, if the subject "remembers" that he took the top and bottom match from the second square from the left, and the right side from the fourth square, and constructed a new square below it, he will be almost helpless when the problem takes a slightly different form, e.g.,
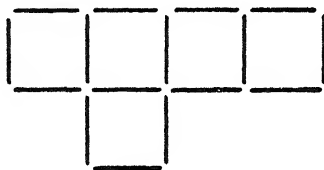
He may discover that there are 16 matches, which would be enough to make four squares, if no one match serves as the side of two squares, i.e., that he must eliminate the common sides. Or he may conclude that the figure has got to be blown apart somehow. But, if he arrives at a principle that he is able to apply successfully, he will not only "remember" how to do the original trick (if he remembers the principle—or can relearn it promptly), but he will also be able to do other tricks of match arrangement that employ the same principle.[6]

However, when the available past experience is not merely recalled, but is selected and applied to a new and somewhat different situation, the process shifts from remembering to transfer. We are ready to consider the question of how and to what extent things learned in one situation are available for use in a different situation.

3. Formal Discipline and Transfer

The Doctrine of Formal Discipline. Formal discipline is the doctrine that practice or systematic exercise or formal drill in a mental function will improve the function so that, as a consequence, performance in different situations in which the function may be employed will be more effective. For example, memory drills will improve "the memory" and enable a person to remember better. Systematic practice in observing, no matter what, will train one's "powers of observation," and so on. It was believed that certain subjects, because of their formal organization, were especially valuable for this purpose. Grammar, particularly of an inflected language; geometry, with its cogent demonstrations; and logic, with its classification of verbal relationships, may be taken as examples of formal subjects which, therefore, were believed to have high disciplinary value. Occasionally, one notes a semantic transition,

[6] G. Katona, *op. cit.*, see Figs. p. 79.

for these subjects have little of interest or practical value to most pupils who, for this and perhaps for other reasons, may cordially dislike them. It therefore came to be implied, and even stated outright, that it was good for pupils to do what they didn't like to do. The discipline was "moral" as well as intellectual!

It would hardly be necessary to rattle the bones of this old controversy were it not for the fact that it experiences a resurrection almost every time a school or college sets out on a program of curriculum revision. Originally brought forward to bolster up the classical curriculum against the incursions of the natural sciences, it is likely to appear suddenly in support of the natural sciences to ward off the attacks of the social sciences.

The doctrine has a plausibility about it that defies all reason, while the consequences are often disastrous. The form of material which is studied is not the form in which it appears in daily life, but has been systematized through the years and centuries, whether it is a Euclidian demonstration, a Latin paradigm, or the multiplication table. If the pupil doesn't see how these are going to help him to think more effectively, that is all right. It isn't necessary for him to. His "faculties" will be strengthened automatically if he will be a good boy and study his lessons!

If he is inclined to doubt, all he needs to do is to look around at those who have already profited by such discipline. Here is a lawyer who is particularly successful in analyzing the cases that come to him, who attributes his success to his training in Latin and mathematics. A business man believes that the slow processes of translation of the classics is good training for the boy who has chosen a business career. An educator announces that the struggle to understand the meaning of some of the great books of the rather distant past is the best training for life in the modern world. A scientist insists that all college students should study science, not for the knowledge they may acquire, but for the laboratory training they will obtain.

Such statements have no more value than other testimonials. In the mouths of those who have supposedly been so disciplined, they are a denial of the very doctrine they advocate, because of the fallacies they contain. Most obvious is the fallacy known as *post hoc ergo propter hoc* (after this, therefore on account of this), the delusion of Chanticleer, who thought that his crowing roused the sun until one morning he slept over and was awakened by the sun's rays! An event that precedes another is not necessarily the cause of it. It is quite as likely that the success of the lawyer, the business man, the educator, and the

scientist, in their favored subjects and in their later life, was due to common causes—native intelligence, perhaps, and ambition to succeed, and not to the particular training they received. Similarly, though children who follow the traditional college-preparatory curriculum may do better—say, in English—than those who do not, the study of the facts has shown that they did better in English before they started the traditional curriculum. Even if it is granted that there are real educational values in a thorough study of the humanities, which few would deny, it does not follow that a year's study of a foreign language, ancient or modern, will to a lesser degree have the same effect.

Transfer in Mental Functions. It is not enough, however, merely to expose fallacies. A proposition may be true that is supported by fallacious arguments. The chief trouble with the doctrine of formal discipline is that it is a doctrine to be accepted, not a hypothesis to be investigated. The term transfer has come into common use to facilitate further investigation of the claims. Under this head one can inquire what learning is transferred to a new situation, how much, and under what circumstances, and so determine whether there is enough gain to make up for the effort expended.

If the mind is like a muscle and can be developed by formal exercise, as the doctrine of formal discipline proclaimed, the natural thing to do would be to measure its strength, then exercise it, then measure it again, to see what the effect of exercise was. The first such experiment was performed, somewhat informally, by William James, his only experiment of major importance. During eight days he memorized 158 lines of Victor Hugo's French poem, *Satyr*, which took, altogether, $131\frac{5}{8}$ minutes. Then, for training material he worked about twenty minutes a day for thirty-eight days learning the first book of Milton's *Paradise Lost*. After this memory-training period, he went back to Victor Hugo. But, instead of memorizing it more rapidly as he had expected as a result of all the practice, he found that it actually took him longer to learn the second selection of 158 lines than it did the first—$151\frac{1}{2}$ minutes instead of $131\frac{5}{8}$. Repetitions of this experiment with the same and different materials by other experimenters brought similar results—usually equivocal, sometimes showing dubious gains, but never the improvement we have been led to expect.

Before going on, it may be well to examine more carefully into the technique of this type of experimentation. The plan is: (1) to find out one's ability in a task by means of an *initial test*, (2) to furnish *training* over a longer period in a related task, and (3) in a final

end test to measure the consequent performance of the subject on the initial task or one similar to it. The assumption is that any improvement is due to the training period. The function to be trained, however, may have been brought nearly to the limit of the subject's ability before the experiment began, so little improvement would be possible. In some experiments the initial test has been so long that it alone may have acted as a training period, bringing the subject up close to his physiological limit before the true training period began. To overcome the influence of this factor, the end tests are shortened. Also, some subjects are given these but not the intermediate training. Such subjects constitute *controls*, or the *control group*. If the controls without the training show as much gain as the regular subjects who have had it, clearly any gain in the score of the subjects cannot be attributed to the training period.

Experiments of this sort have been performed not only on memory for different kinds of materials, but also on other functions, such as sensory discrimination, estimation of weights, speed of cancellation, speed of card-sorting, and many others. The "residual gain"—that is, the difference in the percentage correct between the performance of the experimental and that of the control groups—was in most cases slight, though it has varied from zero or less to as much as 60 or 70 per cent. In most cases the training did transfer, though in small amounts. When the training tasks and those of the end tests were very similar, the amount of transfer was greater.

Transfer in School Subjects. Likewise, many studies have been made of the effect of formal training in arithmetic (mental multiplication), grammar, Latin, biology, geometry, and the like upon performance in arithmetic (other number combinations), reasoning, correct English usage, vocabulary, reading and writing, and on biological, geometrical, and other tests. The results were even more disappointing. When the same processes were employed on different problems in the same field (which is ordinarily thought of as learning and not transfer), there was definite residual gain, sometimes as much as 20 or 30 per cent. But with material not thus closely related, there was little or none.

Another kind of experiment showed the influence of different kinds of practice.[7] The subjects, 108 college sophomores, were divided into three groups—control, practice, and training, all three of which took tests in six memory functions at the beginning and at the end of the

[7] H. Woodrow, "The Effect of Type of Training upon Transference," *Journal of Educational Psychology*, vol. 18 (March, 1927), 159–172.

experiment. There were tests for retention of rote poetry, rote prose, miscellaneous facts, Turkish-English vocabulary, history dates, and consonants presented orally. The control group took only the tests; the practice group, between the two end tests, spent a total of 177 minutes in memorizing similar materials; while for the training group the same amount of time, 177 minutes, was divided between practice and instruction in the technique of memorizing. This instruction consisted of the demonstration of the following characteristics of efficient learning:

1. Learning by wholes
2. Use of active self-testing (the method of recall)
3. Use of rhythm and grouping
4. Attention to meaning and the advantage of picturing, or, depending on the individual, otherwise symbolizing the meaning
5. Mental alertness and concentration
6. Confidence in ability to memorize
7. Use of secondary associations (mnemonic devices)

The results for each group and for the six memory functions were unequivocally in favor of the training group. The practice group did scarcely better than the controls, but the training group averaged 30 to 40 per cent better. "In short," the experimenter concludes, "the experiment shows that in a case where one kind of training—undirected drill—produces amounts of transference which are sometimes positive and sometimes negative but always small; another kind of training with the same drill material may result in a transference, the effects of which are uniformly large and positive."

If procedures in scientific thinking are inculcated, if relationships between Latin and English are pointed out, if the rules and definitions are applied, if the paradigms are used as a point of reference only, from which the pupil gradually becomes emancipated, if the laboratory manual is an inspiration and not a recipe book, if historical problems are envisaged in their present-day guise—if, in short, techniques of study and right methods of attack on problems are practiced—instruction is no longer formal, but is woven into the texture of the child's behavior patterns.

Positive and Negative Transfer. What transfer effect there is, is sometimes positive and sometimes negative. Skills and abilities acquired in one situation may interfere with successful performance in another. This phenomenon, referred to as *interference,* is a familiar experience. While practice in baseball may help a person to hit a tennis ball, he is

apt to go in for distance until he learns how to hit a tennis ball. The slow rate of reading required for textbooks is likely to slow down a reader when he has easier materials. The Latin pronunciation of proper names renders their English pronunciation difficult. A salesman may have developed a hail-fellow-well-met technique which may not be acceptable to more conservative customers in another line of business.

In countless ways, what one has learned may be applied to situations which it does not fit. Conditions may look alike, but they are really different and call for a different mode of approach. If this is not realized, the influence of training overcome, and the new methods learned, the person may be worse off than he was before. If previous training merely does not apply or is not used, he is no better off. If it does apply, and is adapted to the new situation, he is definitely benefited.

Identical Components. The explanation of transfer, positive or negative, is to be found in the presence of *identical elements* or components in the two situations—the one experienced or practiced earlier and the one that is to be met. Experiments have shown that the nearer alike the two situations are, the more likely there is to be transfer. But situations may be very much alike except for one small part (such as the position of a decimal point) and still be very different. Subjects who had been trained to estimate the size of rectangles from 10 to 100 sq. cm. in area did only 44 per cent as well with differently shaped rectangles though the sizes were the same. And when the shape was kept constant but the area increased from 140 to 300 sq. cm., they were able to do only 30 per cent as well. In the same way, training in estimating light weights had very little effect on the subject's abilities to estimate slightly heavier weights.[8] Apparently in these cases, the cues on which the subjects depended were not common to the two kinds of situations, though the objects were identical in shape or size.

What are the components which may be identical in two or more situations? They are not only objects, like squares, buildings, or domestic animals, which usually call for the same kinds of responses wherever one encounters them. They may also be relationships of a more abstract sort that call for similar kinds of approach. On this point Thorndike wrote as follows:

Chief among such identical elements of practical importance in education are associations including ideas about aims and ideas of

[8] E. L. Thorndike and R. S. Woodworth, "The Influence of Improvement of One Mental Function upon the Efficiency of Other Functions," *Psychological Review*, vol. 8 (May, July, Nov., 1901), 247–261, 384–395, 553–564.

method and general principles, and associations involving elementary facts of experience such as length, color, number, which are repeated again and again in differing combinations.[9]

The existence of "general principles" which find application in the two situations, as noted by Thorndike, is one which has been much discussed, and *generalization* has even been made into a separate theory of transfer. The illustration has been used of a dog that learned to open a particular latch but could not see that the same principle of opening doors is applicable to many other latches. He could not generalize his experience. In an oft-quoted experiment, subjects were given practice in shooting at a target under water.[10] After the position of the target was changed, the group that had been taught the principles of refraction were reported to have done better than the control group that had not been thus instructed. A determined effort to repeat this experiment, however, produced no such unequivocal results.[11]

In spite of this contradictory evidence with the target problem, a principle can so operate as was shown in the match experiment previously referred to. Those subjects who learned and understood the principle of breaking up the pattern of squares so that the same side was not common to any two squares were able to solve different arrangements and even make up new arrangements of their own. In other cases, however, the principle may not be thought of as applicable, or the learner may not be impressed with the desirability of applying it. In an earlier experiment, it was shown that it is not enough for arithmetic teachers to demand neat papers; those in language and spelling will not be improved thereby, because the idea of neatness is not automatically generalized so that it becomes effective in other situations.[12] It is only when the idea has been generalized and motivated to form an "ideal" of neatness in one class, that it will be effective in other classes where it has not been mentioned.[13]

When the learning situation and the one to which the learning is

[9] E. L. Thorndike, *Educational Psychology, Briefer Course,* New York: Teachers College, Columbia University, 1924, p. 269.

[10] C. H. Judd, "The Relation of Special Training to General Intelligence," *Educational Review,* vol. 36 (June, 1908), 28–42.

[11] Gordon Hendrickson and W. H. Schroeder, "Transfer of Training in Learning to Hit a Submerged Target," *Journal of Educational Psychology,* vol. 32 (March, 1941), 205–213.

[12] W. C. Bagley, "Experiments on Transfer of Ideals of Neatness," in *Educational Values,* New York: Macmillan, 1911, p. 188, experiment reported by C. R. Squires.

[13] W. C. Ruediger, "The Indirect Improvement of Mental Function through Ideals," *Educational Review,* vol. 36 (November, 1908), 364–371.

expected to transfer are the same, as in a laboratory or shop, in a student council or community study, the process is more correctly spoken of as learning than as transfer. There is an identity not only of principles and needed responses, but also of actual situations. Obviously, this kind of "transfer" is the most effective when it can be arranged. But it is impossible to bring every possible future situation to the child. He may get into "the same kind" of situation, but who shall say whether it calls for the same response or a different one. The reflective processes are involved. More is needed, if there is to be any assurance that experience in one situation will be useful in another, than mere identity of components in the two situations, even when the identity of a generalized principle is present in both. With this much alone, there may be positive transfer, negative transfer, or none at all.

4. FORMS OF AVAILABLE EXPERIENCE

Retained Response Patterns. If we set out to analyze what is necessary if maximum positive transfer is to take place, we find the following essentials: (1) retained response patterns, (2) set or attitude, (3) perceived identical components, and (4) comprehension of the structure. These conditions will be briefly discussed.

It is perhaps obvious that if experience is to be of any value in a new situation it must be retained. This applies to experience with facts, such as number combinations, meanings of words, statements of principles or laws which might be applicable, techniques of handling apparatus, and so on. Initial learning is necessary, for one could hardly expect valuable outcomes from transferring what has been forgotten and so does not exist. There is no need to belabor so obvious a point. But if some response is made to the new situation, some learned response patterns are operating (unless the response is purely instinctive). All are not forgotten, though the needed ones may be. If the wrong process transfers, the results are negative.

Set and Attitude. In the second place, retained knowledge and skill may be available for use, but if it is to be used there must be some inclination to use it. Here is where the "ideals" come in, the motivation or drive. If a person wants to be neat, or courteous, or accurate, or skillful, or successful in an undertaking, if there seems to be some advantage in attaining the goals which the school holds out to him, he may call on his previous experience to enable him to achieve them. In experiments, such a set, in the form of a favorable attitude, is a matter that is arranged between the experimenter and his subjects. But in school or life situations a natural inertia or a negative attitude toward

a task, or the teacher, or others concerned, may interfere. A child—or an adult, for that matter—may know what to do but not want to do it. To induce the desired set, so that pupils will want to apply what they have learned, is one of the skills that the teacher must seek to develop.

Perceived Identical Components. In the third place, retained knowledge and skill may be available for use, but to be used it must be called out by the new situation where it is applicable. Again, the wrong experience may be brought to bear, and negative transfer occur; or the individual may be at a loss to know how to respond and so no transfer at all will take place. In such cases the teacher might say, "Do you remember what we did last time? Well, let's see if it would work here."

In cases where previous experience is available but not called out by the new situation, the identical components are not recognized in their new setting. Other aspects of the new situation are prepotent, and the learner does not see that it is just another case of the same old thing. Or, in cases of negative transfer, he recognizes components that are identical with those of other experiences he has had and so responds to them instead.

Naturally, such errors of response are not necessarily the rule. In many cases the appropriate components are prepotent, and the learner responds to them correctly, hardly realizing that he is facing what may be called a new situation. His approach to a verbal proposition, a piece of delicate apparatus, or a social problem, as the case may be, is the same whenever he meets it because he "has learned" that certain procedures are more effective than others in such cases. But at other times, when this may not occur, pupils need practice in applying what they have previously experienced in different kinds of situations so that they may become more adept in identifying the identical components to which they have learned to respond.

Comprehension of Structure. In the fourth place, retained knowledge and skill may be available for use, but to be used it must be flexible, and the structure and relationships of its parts understood, permitting modifications in the arrangement or sequence of parts which, however, are recognized as organized according to some principle or plan. The original experience is made up of essential and chance relationships which the learner needs to distinguish. In the old-fashioned latch, the essential part is a bar to be lifted from a notch. The size, materials, or means of exerting pressure may vary. The dog in the illustration perhaps learned that a downward pressure opened a particular door.

This learning would not transfer to a latch which had to be lifted by upward pressure or by pulling the latch string. A child who is taught that "of" means multiply (e.g., ⅘ of 250) may transfer this knowledge satisfactorily until he runs into such a question as what per cent is $6.00 of $200.00. If he does not comprehend the relationships involved, he is likely to be led astray by chance relationships of the identical component.

This point is perhaps the most significant of those which have been mentioned. If one follows the accepted procedure in situations which seem the same, owing to striking similarities, he may be all wrong in his response. He may be baffled and disturbed at his unexpected failure, or he may not even realize that the ensuing confusion is of his own making, and look around for someone to blame. It will therefore be advantageous to examine this point more carefully.

5. DETERMINING THE RELEVANCE OF PAST EXPERIENCE

Piecemeal Examination of the Situation. While animals and children, and adults as well, will respond in learned ways to familiar parts of a new situation, the problem of transfer for schools is to teach pupils in such a way that what they learn will be used, and used advantageously in the new situations that will confront them. If this is to be the outcome, practice in the kinds of situations that are likely to be met is essential, giving pupils the experience of selecting the appropriate response.

The first step is the piecemeal examination of the new situation. This means observing it carefully, noting its different parts and their relationships, in other words, structuring it (Chapter XII), followed by various kinds of restructuring. The figure-and-ground relationships (Chapter X) should be noted, and different parts successively made the "figure," that is, emphasized and examined in relation to the rest. If the situation is a verbal one, the meanings of the words and phrases need to be studied in order to discover their importance or weight, also what is written "between the lines," for what is not said may be more important than what is specifically stated. People who "jump at conclusions," or who trust to intuition, are inclined to avoid such an "estimate of the situation," but it is necessary if error is to be avoided.

Significance of Components. However, the charting of the situation, though necessary, is not enough. The significance of the several components must be studied. The learner may respond by analogy, and

his response may be right or wrong—the transfer positive or negative. If the situations are analogous, components of the first are identical with some in the second, and these are the ones that are selected, and learned responses made to them, if response is by analogy. But other components are different, and these may call for quite a different response. Perhaps the most elemental illustration of this fact is the trap. The bait is food to which the animal responds by eating it. If the food is in a dish, or a part of the natural pattern of the woods and fields, the response is correct. But its location in a trap makes the situation totally different. Or a child who has a black and white kitten at home says, "Nice kitty," to the skunk. Identical elements are size, color, furry animal, and so on, and learning transfers to the new situation. But, the differences are important. The nonidentical components must be studied carefully if one is hopeful of positive transfer.

Selection of Stimulus and Response. The implication of the above paragraph is that the choice must be made of what element or relationship to respond to, whether to the bait or the trap, the smile in itself or the smile in relation to the sales talk, the behavior of the child in relation to the rules or in relation to his home background, and so on. And, likewise, the choice must be made of what response would be most satisfactory. It is possible to respond in a number of different ways to any part of a situation. Even a response to the right part might be a wrong response.

Consequences of Responding. How can one tell which is the correct part to respond to and what is the correct response? The answer is to be found only in the evaluation of consequences. Some of these may be inferred. Sometimes they may be tried out on an experimental basis At other times it is necessary to act and hope for the best, keeping the fire hose and ladder handy, so to speak, in case.

It may have become apparent that in discussing transfer we have come around again to reflective thinking, but we approach it from a different angle. Instead of focusing on the problem with which one is confronted, we have been looking at the materials available for a solution, should a problem arise. True, previous experience may transfer to a new situation almost automatically, and no problem become apparent unless the outcome is a failure. Or the new situation may present the problem on its first appearance. However, the process of transfer is not necessarily so lengthy as this discussion would seem to make it. In most cases the situation may be taken in at a glance and appropriate action initiated at once. However, one must be on guard lest the wrong

previous experience is called into play by one aspect or another of the new situation.

The phrase "teaching for transfer" has sometimes been used, though it is generally frowned upon in favor of such a phrase as the "objectives of teaching." But if other objectives than rote memorization are sought, and if the true values of education are to be realized, we cannot merely continue to drill pupils on formal subjects and trust to luck that their schooling will somehow do them good when they get older. We can, instead, follow such a formula as this: "Now you have learned that this is the way you use it here, here, and here." And then we should probably follow up with a second formula: "You have learned this, this, and this. Now what would you do in a case like this? Why?"

Techniques within a particular subject matter or vocational field have in some cases been developed to this extent. There is much yet to be done in applying them to other school activities, to situations of home and community life, and to the wider responsibilities of the citizen.

In Summary

Without the capacity for remembering, or, more broadly speaking, of retaining the ability to make the responses that one has learned to make, the whole process of learning would be quite futile. Both native retentive capacity and learning conditions as they affect retention have been studied in psychological laboratories for a number of years, and some of the results are applicable in school situations.

Studies of immediate and delayed recall by memory-span, symbol-substitution, and simultaneous-exposure techniques have shown that there are wide individual differences, that relatively small but varying amounts of material can be repeated immediately after a single presentation, and that eye-witness reports are quite undependable in matters of detail. They have also revealed something of the nature of the forgetting process, and that it is apparently due not so much to a process of fading as to interference and inhibition among things learned.

The experiments of Ebbinghaus and those who have followed him demonstrated the course of the curve of forgetting and the amounts retained (by the nonsense-syllable and time-saved techniques) under varying learning conditions, and the superiority of distributed over massed repetitions and of overlearning. Later experiments have confirmed empirical conclusions as to the desirability of learning by grouping discrete items in meaningful wholes, preferably relating them to some principle. The logical definition as a classification system, as well as the

use of the Aristotelian proprium and accidens, are useful for speeding learning and prolonging retention.

But past experience, to be of value, has not only to be retained, it must be available when needed. The doctrine that the mental faculties are strengthened by the systematic study of formally organized subject matter has turned out to be only a confusing half truth. Investigations of the extent of transfer of learning to new and different situations have found little, although transfer undoubtedly takes place. The more the situations are alike (have identical components), the more transfer; but it may be negative as well as positive.

An exploration of the factors involved in transfer reveals the existence of retained response patterns ready to go into action, the necessity of perceiving and identifying the familiar components in the new situation, and the necessity of selecting the response that is appropriate for those components when they are in their new environment. While transferred responses may be made more or less automatically without much rational thought, they are as likely to be wrong as right unless one examines or structures the situation, determines the significance of the components, identical and other, and selects the stimulus pattern and the response to be made on the basis of the probable consequences.

Questions

1. Have someone pronounce several series of digits or words, and compare your ability to repeat them from memory with the norms given in Whipple's *Manual*, II, Test 38.
2. Have someone read the Marble Statue or Dutch Homestead passage (Whipple, II, p. 209) to you, then score it for ideas. This may be done as a class exercise and the results plotted with the adult norms, Table 26.
3. Give a formal definition of saving method, overlearning, mnemonic device, formal discipline, transfer of training, mental function. In the definitions, clearly distinguish genus and differentia.
4. Draw up a topical outline, using the five points of "accidens," and "proprium," for the discussion of some topic of a subject you have studied such as The Romantic Movement, Conservation, Penicillin, The Life of ——, The Filibuster, etc. List subpoints under each head. Do these heads aid in the recall of points that otherwise might not be thought of? (Of course, what would be the best order of presentation would depend on other factors.)
5. In what ways do you recall using knowledge which you have acquired in any courses you have taken? Can you think of ways in

which the knowledge so acquired might have been made more easily adaptable to later situations?

6. Can you think of situations that have had components identical with a number of previous experiences so that it was difficult to decide which previous experience should be transferred? How was a decision reached?

7. Can you recall situations in which the transferred experience gave the wrong answer? Why was this?

8. Indicate ways in which one of the following principles might transfer to school situations with which you as a teacher might be called upon to deal: conditioning, positive versus negative directions, repetition, effect, security, frustration.

9. Analyze the concept, "common sense," in terms of transfer with special reference to the significance of components, and the selection of the stimulus and response.

Readings

Cameron, E. H. *Viewpoints in Educational Psychology*. New York: Century, 1930.
A brief summary of some of the more important experiments in transfer is given in Chapter XIII.

Ebbinghaus, H. *Über das Gedächtniss*, 1885; *Memory*. (Translated by H. A. Ruger and C. E. Bussenius.) New York: Teachers College, Columbia University, 1913.
The original monograph, of interest especially to advanced students.

Garrett, H. E. *Great Experiments in Psychology*. (Rev. ed.) New York: Century, 1941.
In Chapter X the work on memory is reported, including that of Ebbinghaus; in Chapter IX that of Thorndike and Woodworth and of others on transfer.

McGeoch, J. A. *The Psychology of Human Learning*. New York: Longmans, Green, 1942.
A volume for the mature student. See especially Chapters VIII-XI.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology*. New York: Harper, 1937.
See Chapter XI on transfer of training and Chapter XIII on the results of schooling.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.
Pages 123–125 contain a quotation from Ebbinghaus, and Chapter XVI is devoted to problems involved in transfer.

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

Chapter XIV contains selections dealing with various phases of the memory process, and on pp. 413–420 there is a brief discussion of transfer.

Thorndike, E. L. *Educational Psychology Briefer Course*. New York: Teachers College, Columbia University, 1924.
The permanence of improvement is discussed in Chapter XVII, and the influence of improvement of one mental function upon the efficiency of other functions in Chapter XVIII.

Woodworth, R. S. *Experimental Psychology*. New York: Holt, 1938.
Excellent report and analysis of experimental studies in Chapters II, Memory; III, "Retention"; IV, "Memory for Form"; VIII, "Transfer of Training"; IX, "Economy and Interference in Learning and Remembering."

Learning Experiences

THE processes involved in learning are discussed in the four preceding chapters, and a number of the generalizations or "laws" of learning are presented. While these latter are not actually scientific laws that can be stated in the form of equations, they yet reveal the conditions under which learning takes place. In the four concluding chapters of this volume, the relation of these processes and generalizations to different kinds of learning experience is shown. The objective is to take them out of the systematic organization and reveal them in their actual operation in the learning of children and young people. In this way their nature is more clearly demonstrated, and they can be seen for what they are—guides to the teacher for promoting more effective teaching.

Following directly the chapter dealing with memory and transfer, both of which emphasize verbal learning, the subject-matter areas depending primarily on verbal (and numerical) symbols are discussed. Learning of this sort traditionally constitutes the great bulk of the work of the school. Next, and depending largely on verbal directions, the processes involved in the acquisition of perceptual-motor coordinations are considered, and then the kind of experience, whether appreciative or creative, that is evaluated esthetically. Lastly, attention is given to the processes of social learning, that is, of developing the ability to respond adequately to people in different kinds of situations.

It will be noted that the material presented in all the preceding chapters comes to a focus in this last section. Not only is the adjustment of the learner an important factor, as well as his stage of development, but also the perceptual, associative, and reasoning processes, with varying emphases—all are involved. A simpler outline could be followed if

one kind of learning were used in each kind of subject matter; but, instead, the processes and principles elaborated all turn up in all kinds of situations. This has its advantage, however, for according to the principle of concomitant variations a more complete understanding should result. While no effort is made to outline or describe instructional methods in the various subject-matter areas, the general nature of such methods is often implied in the description of the psychological processes, as is also the nature of the criteria that would be of value in the selection of curricular activities.

Symbolic Learning–
Knowledge and Understanding

The School Subjects. One of the main purposes of the schools is to provide the opportunity for children to acquire facility in the use of the symbolism of letters and numbers. The ability to respond adequately to the artificial language symbols is not only essential to the transmission of the cultural heritage, and hence to a continuing civilization, but it is also a prime requisite for the individual if he is to adjust adequately to its complexities. Any single-minded preoccupation with symbolic subjects, to the exclusion of other activities, however, is bound to misfire, since people are more than knowledge machines. Motor skills, esthetic enjoyment, and social participation are also necessary for a well-rounded life.

Most of the time of children in school, however, is given over to symbolic learning. Fundamental are the language and communication skills —hearing (listening), speaking, reading, and writing, including spelling, punctuation, handwriting, grammar, and composition. In the high school, these processes are usually taught in the broadly inclusive subject known as English, though they are often quite properly emphasized in other subjects, and reaffirmed in foreign-language study. The symbolism of numerical and spatial relations is taught in arithmetic, algebra, and geometry. Various logical relationships with their conventional conceptual framework are taught in the natural sciences, i.e., general science, biology, chemistry, and physics, and in the social studies—drawing from the academic fields of history, civics, geography, economics, sociology, and psychology.

It will be our purpose in this chapter to gather together some of the facts already discussed concerning the nature of the individual and the process of learning and show their relationship to the acquisition of

knowledge and the development of thinking in these subject-matter fields.

1. Motivation in Symbolic Learning

The Communication Skills. Four fundamental abilities must be acquired, abilities individuals need for purposes of communication. The first is to listen or *hear,* that is, to comprehend the spoken words of other people. This process begins before any of the other three and continues to develop along with them. The child lives in a world of spoken discourse for many months before he can participate in it except as it is especially adapted to his stage of development. But very early he learns to pick out significant utterances and to respond appropriately. Those learning a foreign language frequently have no such opportunity to hear the language spoken, an experience which is apparently very important, since the deaf, who are completely deprived of this experience, learn to speak only with the greatest difficulty. It should be added that full comprehension implies not only the specific meanings of words used, but also the intent of the speaker, his emotional attitude, his bias, and the significance of what is said for the hearer and for others.

The second ability needed is to *speak,* that is, to verbalize one's wants and needs and give expression to one's ideas. The early speech of children is sharply condensed, whole sentences being expressed by a single word, such, for example, as "Go!" which might be more fully rendered, "In spite of what you may say and your quite obvious disinclination to have me accompany you, I am determined to go along, and I'll raise a terrible howl if I am thwarted in this particular!"

Speaking, as a rule, requires no special instruction. Intelligent illiterates may be able to speak more accurately and understand the spoken language more fully than some who have been taught to read and write. There are three points, however, where instruction in speech is important. These involve improvement in motor skill, which is discussed in the next chapter. One is to correct defective utterance due to physiological handicap, incorrect learning, or a foreign-language background. A second is to acquire the correct pronunciation of a foreign language, which, like one's native tongue, should be heard to be learned. Special training can be given in the recognition and pronunciation of new sounds and in the discrimination of sounds that make a difference in meaning. The third is to make speech more effective, as in radio work, debating, oratory, and dramatics.

In ordinary life, people of any age have a natural inclination to tell, to report on what they are thinking, or on what they have been doing.

And more than this, speech serves to control and direct the behavior of others. This has its advantages and its dangers. The correct and appropriate utterance may bring compliance, while infelicity may result in confusion and disapprobation. It should be urged, however, that, as in the case of propaganda, suggestions should not be followed merely because they happen to be couched in well-turned phrases.

The third ability needed is to *read*, and instruction in reading is an exacting and continuing responsibility not only of the elementary school but of the secondary program as well. Literacy is a very recent acquisition of the human race, and there are still millions of illiterates today, some estimates running as high as half the world population. In early cultures the priest class was the repository of learning and often held others, even kings and emperors, at its mercy by its custody and interpretation of authoritarian books. Europe was the first of the continents to break away and develop schools in which large numbers of people could learn to read, a tradition that was brought by the early immigrants to the shores of North America. Reading has been taught in many ways, and some of the problems involved and methods employed will be discussed shortly. Reading is, of course, not just mouthing words. It is getting thought from the written or printed page, or, more accurately, it is a process of obtaining intended mental experience from visual symbols. It involves selecting and evaluating, and is properly accompanied by satisfaction and perhaps enjoyment.

The fourth ability needed is to *write*. Handwriting, a perceptual-motor skill, is discussed in the next chapter. The accompanying abilities, to spell and punctuate, to write grammatically and with proper regard for rhetorical principles and niceties, has long been a major objective of English instruction. Too much emphasis, however, can be placed on the fine points of correctness to the neglect of the main purpose of writing. This main purpose is to say something, that is, to convey thought, to present the visual symbols that will produce the desired mental experience in the reader.

The Fundamental Processes Are a Means. It has been said that the proper objective of instruction in reading is not that pupils should "learn to read," but that they should "read to learn." This epigram expresses the instrumental nature of the fundamental processes. To hear, to speak, to read, to write—these are not ends in themselves. They are means to other ends, and they are valuable only as the ends are worth while. Instead of merely testing these abilities, it might be better if schools should ask of their pupils, What do you listen to? What do you say? What

do you read? and What do you write? Pupils are motivated to acquire these fundamental skills when such skills can be used for something, when they have some function.

The so-called functional approach in the learning of the basic communication skills may be illustrated by a little elementary-school project. Some of the children wanted to know how paper is made. They wondered if they could make it. With the teacher's help they found a description of the process and discussed ways in which they could adapt it to such equipment as they could gather together. The planning provided experience in listening, speaking, and reading, which was continued as, with kitchen utensils and a gas plate, the rags and chemicals gradually assumed a somewhat lumpy resemblance to paper. Experience in writing was added in their compositions on "How We Made Paper."

Similarly, learning to manipulate the symbols for representing the relationships of number and space may be functional if it is acquired in order to solve problems involving such relationships as have meaning for the pupils. As in the verbal area, if the experience comes first, then the numbers, including the fractions, decimals, and diagrams, clarify and extend the experience. Such an approach has resulted in great changes both in curriculum and method.

As a consequence, a child learns to use the verbal and numerical symbols in order to learn and in order to comprehend and appreciate and deal with the data of the world as they are met in his own experience and brought together in the arts and sciences. Clearly, if he is handicapped in the use of symbols, if he doesn't know the meanings of certain words, for example, he will acquire such comprehension and appreciation with difficulty or not at all. But the words have meaning for him only in terms of his own experiences. He cannot really learn the symbols first. The symbol-learning and the comprehension go along together, mutually aiding each other. The task of the teacher in all the subject-matter fields, in developing a "knowledge of the subject," is to promote language learning. To summarize, this is done by providing experience, introducing the kinds of verbalization by which the experience is symbolized, clarifying the meanings of the symbols, and providing practice in their use.

The School Subjects and Frustration. The symbolic world to which the learner is thus introduced needs to be within the range of his capacities. If it is not, the frustration phenomena earlier discussed will appear. Some have urged that, since people will be faced with many frustrations

when they get out of school, they might as well get used to them early. The difference between the adult world and school, however, lies in the fact that children are in school in order to *learn* and that learning is retarded when pupils are forced into situations which they are not mature enough to meet. There will be plenty of difficulties anyway, but children learn best, not when frustrated, but when meeting tasks which they are able to perform. Otherwise, emotional, aggressive, and escape behavior and the other phenomena of frustration appear. And when they do, the teacher finds himself more preoccupied with problems of "discipline" that he himself has brought on than he does with problems of learning, with which he is supposed to be concerned.

Pupil Needs and the Reading Program. It has been pointed out that reading is instrumental in that it furnishes various satisfactions, providing it is adapted in point of difficulty to the ability of the learner. What are the satisfactions that might serve to motivate the pupil?

First is sheer enjoyment, the enjoyment that a good yarn brings to a reader of any age. Some austere persons seem to feel that if a child is enjoying himself, he isn't learning anything. But the rapid reading that is stirred by interest and excitement not only develops facility in reading, but in addition develops positive attitudes toward the process and toward the whole situation. Reading is fun, and school is therefore a pretty good place.

Secondly, it is a means of finding out what one wants to know. It may be the inscription under a picture, the rules of a game, or, more broadly, the facts about the nature of the world. The curiosity of many children seems well-nigh insatiable, and when they realize that they can find their answers in magazines and books, in dictionaries, and encyclopedias, reading makes sense.

Lastly, there is an indirect advantage, not always recognized by the reader. This is the influence that reading may have on the developing personality. This influence, of course, may be superficial. On the other hand, the reader may in fact become what he reads. The people he reads about may influence his thinking and actions in the same way that the people about him do, and as he grows older great books—or harmful ones—may help to mold his life. The effect of reading on personality maladjustments is beginning to be studied, and the influence of what is called bibliotherapy evaluated. All this serves to emphasize the importance of a wise selection of books for individual children. And while there is still a place for primers and basic readers, with their scientifically determined vocabulary load, a good reading program must include a

choice of a wide range of reading materials if the pupils are to gain what they might from their reading.

2. Individual Differences in Reading

Interest. The fact that pupils need to acquire proficiency in the fundamental processes does not necessarily imply that all are equally eager to learn. Some are tremendously interested in the discoveries to be made between the covers of a book, while for others its content is of no concern whatsoever. It is therefore important that the content be adapted not only to the maturity level of the learner but also to his range of interests. Mature illiterates, for example, whether in prisons, in the army, or on the farms in the so-called backward countries, will not want to fool around with the children's stories in the first-grade readers, though these may be adapted to their stage of reading skill. Equally simple materials can be prepared for them dealing with the life they know or are interested in. Similarly, all children in school should not be expected to be equally motivated to read what some of them enjoy. School libraries are coming to include large numbers of different kinds of books, varying not only in difficulty but in content as well. And teachers seek to discover not what *the* child, but what *this* child, is interested in reading.

Readiness. One of the most troublesome instructional problems, one that has concerned teachers and research workers alike, is that of determining the time when pupils are ready, that is, sufficiently mature, to begin various studies. Most of the research work has been done in the field of reading readiness, the effort being made to discover the optimum chronological or mental age at which pupils should first be taught to read, and the environmental conditions that promote a condition of readiness. The factors which indicate a condition of readiness may be classified under three heads: (1) freedom from physical defects, (2) emotional maturity, and (3) intellectual maturity.

Physical defects should, of course, be discovered early and corrected if possible, and the pupil's general condition of health given attention. While the majority of children in school are sufficiently free from sensory defects to be able to hear and read, those with definite handicaps are numerous enough to constitute a real problem. The teacher needs to be on the lookout for such difficulties as have not been previously detected by visual and auditory tests, and to follow through on their correction when this is possible. No teacher will knowingly scold a child

who is hard of hearing or partially sighted for not keeping up with his school work. It is quite as unpardonable to do so unwittingly.

Emotional maturity, in the sense that it is here used, can be judged roughly by the things a child is interested in, his span of attention, and such other perseverative factors as his ability to follow directions and to resist distraction. Reading requires a continuing set, a determining tendency that keeps the individual to the line of mental activity chosen instead of flitting about like a butterfly. The child needs to be able to say, "Don't bother me, I'm busy," to a playmate, and keep on with what he is doing if he is going to be able to read consecutively even a few lines.

Intellectual maturity is perhaps the mose decisive factor in reading readiness, and the one on which the most work has been done. It is generally agreed that children should have a mental age of at least 6.5 before beginning reading instruction. While less mature children may be taught to call words, their progress is slow and painful, and instruction is inefficient. Furthermore, undesirable attitudes are likely to be built up if they are forced into a formal instructional program. This means that approximately 40 per cent of those who begin the first grade are too young to begin reading. Besides mental age scores, certain behavioral factors may be observed. Do they notice details in objects and pictures, and note differences? Are they able to speak easily and to understand what is said to them? Are they normally skillful for their age in climbing about and in the use of play materials?

A number of the significant intellectual factors have been brought together in tests for reading readiness. In some respects they resemble group intelligence tests for kindergarten and first-grade children. Those who take them are asked to identify pictures of animals and various objects, the names of which are read to them, to discriminate pairs of letters, some of which are alike and some different, and so on. The skillful teacher can usually tell when a pupil is ready to learn to read by his interest and desire and by his attention to words, as, for example, the inscriptions under pictures. The readiness tests, however, provide a more objective basis for judgment and are particularly useful in dubious cases or when large numbers of pupils are involved.

Readiness for instruction in other subjects has not been studied so thoroughly as in the case of reading. Perhaps arithmetic offers the next most practical difficulty. It is probable that formal instruction is begun too early in this subject, before pupils have had the quantitative experiences for which the symbols stand. There is a tendency to delay cer-

tain topics such as long division a year or so until pupils have matured sufficiently to comprehend the processes involved.

Supplementary Experience. It is undoubtedly true that two children of the same mental age might not be equally ready to begin to read. The difference might lie in the kind of homes they come from. Kindergarten and first-grade programs provide pre-reading experience—talking, exploring, looking at pictures, and being read to. The presence of other children who show an interest in reading is an influential factor, and many kinds of materials for stimulating an interest in reading are available. But these are all indirect in their influence, since the experiences are or should be valuable for their own sake. Any pressure exerted to get children started before they are ready defeats its own ends.

It is probable that similar care should be employed in taking up any new subject or skill at any level of development. Teachers may sometimes be inclined to assume that young people coming into social studies and science classes, or who are beginning language or shop, are "ready" to start. The teacher may be enthusiastic about his subject, but the beginner may not be, and may perhaps be only going through the motions, or not even that.

Other forms of experience which supplement what may be referred to as direct instruction after the program has been undertaken are in the same category. For reading they may include the use of labels, bulletin boards, scrapbooks, script texts—which may be in manuscript writing or in typed, written form and which relate to what is being carried on—book clubs, imitation radio programs, dramatic skits, and the like. Similar kinds of supplementary experience in which the learner finds and practices his material in different contexts are used at all levels and include assembly programs, audio-visual aids, hobby clubs, student government, community contacts, and others.

Growth Differences. An important factor that makes the adaptation of instruction to individual differences difficult lies in the irregularities of human growth, and this applies not only at the beginning but all along the line. We have noted earlier that children differ in their rates of growth. Some are slow growers, physiologically and mentally; others grow more rapidly. Some show spurts and some do not. The older view that children do, or should, conform to the grade classification, that a grade is composed of pupils of the same general level of ability, is slow to die. The reason may be that, when it is given up, the administrator and the teacher face the fact that children differing as much as four or five grades or more (using average grade achievement norms as the unit

of measurement) are to be taught together in the same room, each on his own level, with suitable books and other materials made available.

Four levels of reading have been described,[1] and analogous conditions could be found in other subjects. The first is the *independent* reading level, the level of difficulty, or ease, at which the child likes to read, the level, let us say, on which most adults operate for reading enjoyment. The child knows the meaning of 90 per cent or more of the words and ideas, he is free from tensions, finger-pointing, vocalization, and lip movement. He reads orally with an accuracy of 99 per cent or better, in a conversational tone.

The second is the *instructional level,* the level at which learning can go on, with comprehension at 75 per cent or better and with pronunciation at 95 per cent or better. There is still lack of tension as new words are learned.

The third is described as the *frustration level,* with comprehension at less than 75 per cent and pronunciation at less than 90 per cent. The picture changes. Tension develops, head movements are observed, finger-pointing, word-for-word instead of rhythmical reading, vocalizations, substitutions of wrong words, a strained expression and definite attempts at withdrawal by pushing the book aside or attending to other objects in the environment.

The *probable capacity level,* at which the child can understand what is read to him, is considerably higher, providing he has had the necessary experience with things and words.

What has been said about individual differences indicates rather clearly that instruction must be individualized far more than it has been in the past. Difficult as this is administratively, it must be done, or the values of schooling are largely lost. A number of suggestions for individualizing instruction have been made. Among these are the following:

1. Give up once and for all the idea that the children in a grade or class should be brought up (or down) to any uniform standard or that they should all learn the same things.

2. Provide books and other materials differing in difficulty and adapted to differing interests.

3. Group the learners in different ways at different times for different purposes. This is referred to as flexible grouping. Sometimes slow learners can be grouped with fast learners for projects of various sorts.

4. Give the gifted pupils freer rein to explore, to follow their bent, to look up things in libraries and museums. Sometimes they can be helpful

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[1] Emmett A. Betts, *Foundations of Reading Instruction,* New York: American Book Co., 1946.

assistant teachers, but don't quash their enthusiasms or force them to do busy work. It may happen that their IQ's are higher than the teacher's, which should not be a source of embarrassment to be countered by force and authority, but of satisfaction for the opportunity to direct and encourage brilliant but immature minds in the direction of greater accomplishment.

5. Give the slow learner the joy and satisfaction of meeting or exceeding goals that are within his range of competence. It is done in institutions for the feebleminded; it can be done in regular schools.

Growth differences at the high-school level are usually viewed as intelligence differences, since the limit of intellectual growth is being approached if it has not already been reached. In the earlier days many young people dropped out of school at the end of the eight-year elementary period to find work. But nowadays, with the more closely knit labor organizations, the relatively larger number of skilled jobs, and the requirements for increased schooling, more and more of them are staying in school and find themselves in programs largely set up for those who are going on to college. The schools have done a great deal to adjust to this situation, but the problem of educating the dull normal, and even the average child, is not yet solved.

From the psychological point of view, solutions will come only when materials and methods are adapted to the intelligence level of the pupils. They will ere long be workers, parents, and citizens. Their responsibilities in these areas will be real ones, and their preparation as a rule is far from appropriate. It may well be questioned whether factoring or conjugating verbs, for example, or requiring them to write on "What the Daffodil Thinks of Spring," provides the kind of meaningful experience they need, or whether "maintaining standards" by compelling them to do these things and failing them for their inability is the proper procedure.

Remediation or Learning? The problem of educating those with a low intelligence level is not a simple one. Children with IQ's below 50 or so should not be expected to learn to read, or at least to make any progress. It should be pointed out, however, that the IQ of some children may increase in a favorable environment, in which case more improvement may be made than was earlier predicted. Children within the IQ range of 50 to 70, the high-grade feebleminded, or morons, can learn to read a little if conditions are adapted to their ability level. IQ's of 70 to 90, ranging from borderline to dull normal, constitute approximately one-fifth of the population, and the children in this intelligence group

are a heavy drag on the progress of any class. They come into both the junior and senior high school unable to read the books issued in English, social studies, and science. Heroic efforts have been made to bring these children up to a level of minimum competence through what is called remedial instruction.

The principles on which such instruction is based are three: (1) reduction of emotional tensions following a clinical study of the case; (2) the use of materials at the level of ability and experience of the child concerned; and (3) a discovery of his particular difficulties and recurring errors, with drill on correct forms. It would seem that the remedying is in reality good teaching, which the pupils may not have had earlier.

When children of sufficient intelligence have not previously acquired the language skills of which they are capable, very rapid gains are often made. However, in the case of the less intelligent who have been slow learners all the way through elementary school, the problem is somewhat different. For them two additional modes of attack seem to be effective: (4) concentration on important points they have not learned but can learn if given more time, and (5) provision for a greater wealth of sensory experience with the things the words symbolize. The cultural background of such children is often pitifully meager and needs to be supplemented before the language symbols have any meaning or significance for them.

A number of different reading tests are available, most of which present sentences or paragraphs adapted to the maturity level of the child, followed by questions on the material presented. The questions are usually phrased in such a way that the answers may be scored objectively. Such tests are sometimes supplemented by vocabulary tests in which multiple-choice "meanings" are given for each of a list of words for the pupil to select the correct meaning. The results always reveal a wide range of reading ability in any one grade or class—some children obviously needing special help, others often far ahead of the average of the group. There are many advantages in a regular testing program such as the better schools employ. The sixth-grade teacher, for example, can discover that a child is reading on the fourth-grade level and treat his difficulties accordingly, especially if his intelligence test scores place him at about the same point. If, however, his intelligence is normal, improvement may be expected, depending on developmental changes, life adjustments, and the adequacy of instruction.

The brighter children, those with IQ's of 130 or above, who, as a rule, are the better readers, have usually begun to read before they come to school, and the regular "readers" are apt to be boring to them. They

can usually make out, however, if there are books suited to their stage of development in the school library. Many different complications may appear, though, even with superior children. If they have been read to a great deal, their aural comprehension and interest may be far ahead of their reading skill, so they may not want to go through the mechanics of reading themselves, particularly the childish stories of the beginner. A variant of this difficulty has appeared in teaching adult illiterates, though materials have been developed for them which make it unnecessary for them to have to read about Fluffy and Puffy!

3. PERCEIVING SIGNIFICANT LANGUAGE PATTERNS

Sensory Discrimination. Pupils may be motivated to listen, speak, read, and write, and the occasions provided for the practice of these communication skills may be within the range of their capacities. But there still remains the task of learning. The next important step is for the pupil to learn to perceive the significant patterns of symbols used. The matter of sensory acuity has been mentioned. Some of the major visual and auditory defects are described earlier (Chapter VII). Suffice it to say at this point that pupils are sometimes considered mentally retarded who are later found to be suffering from some kind of sensory defect. And in the case of visual defects, even when glasses are provided, immediate improvement should not be expected. The child has to start in again where he stopped reading, and he may need considerable coaching.

Another major difficulty for the learner may lie in his failure to discriminate small but significant differences in the symbols used. This runs all the way from distinguishing between b and d, and p and q, to the inflected endings and intonations of a foreign language. It includes matters of punctuation, decimal points, and abbreviations, such as the difference between Q and Q_1. Here the teacher's job is obvious, and relatively simple, providing that he is aware of what the difficulty is. Through the use of emphasis and repetition, he must not only enable the student to see or hear the differences, but he must also teach him to use the symbols correctly.

Spelling. The problem of discrimination becomes serious in the teaching of spelling and composition. In the days of the spelling bee, words were sought that were difficult, whether they were ever actually used or not. The spelling bee was the "quiz-kid" program of an earlier day. Later, words were chosen according to systematic classifications. They were grouped in the spelling books according to size or according to meaning. But this resulted in wasted effort on words that were never

used and on words which pupils could spell already. It is interesting, too, that the first achievement test used in a study of performance in American schools created an uproar, for the results showed that the number of spelling lessons per week bore little or no relationship to the pupils' competence in spelling.[2] Since that time, a revolution has occurred.

Unfortunately, the easy standard of average practice that is good enough for handwriting does not hold for spelling, though as late as the time of George Washington considerable individuality was allowed even the educated in this respect. The school must strive for correctness, as in pronunciation, or throw its pupils under the social ban. The problem is not confined to the elementary school or to any one subject. All teachers must teach spelling, and the techniques are those of perceptual and associative learning.

The selection of words for spelling tends to be more satisfactory if the pupils make the selection on the basis of their own needs. Three procedures follow from this principle: teaching the use of the dictionary; having each pupil make a list of his own, made up of the words he has spelled incorrectly in his written work or has had to look up; and drilling words not as separate items but in context through dictation exercises. The use of words in context as the pupil feels a need for them has been given the pedagogical term "functional spelling" and ties in with the form of learning known as "word study," in which orthography is a part of the exploration of the nature of verbal symbols, which includes also their etymology and meanings in context.

Standardized tests have been devised to measure competence in the mechanics of the language skills. In spelling, the multiple-choice form, calling for recognition of the correct item, is frequently used. The pupil is asked to underline the correct form, e.g.,

1. independant   2. indepentant   3. indipindant   4. independent
1. afairs   2. affaires   3. affairs   4. affares

Word Counts. Word studies have been made to discover what words are actually used most frequently, that the school may confine its efforts to these. If "hydrangea" does not appear in 361,184 "running words" of the correspondence sampled, or in 500,000 "themes" of school children, out it goes, even though it did appear in the older spelling books under the heading, "Flowering Shrubs."

Certainly, children should be taught to use and spell the words they are most likely to need instead of being merely exposed to many more

[2] Joseph M. Rice, *The Public-School System of the United States,* New York: Century, 1893. (Spelling descriptions on pp. 42, 70–73, 84–87, 115–116.)

which they will never use or soon forget. Without such word counts, mere subjective opinion as to a word's importance is all there is to fall back on; and the differences of opinion here are shown by one study which revealed that more than nine thousand words appear in the different third-grade readers![3] The more unusual words will have to be learned as they are needed, either in connection with the school subjects or in other relationships later on.

Ayres's list of one thousand most commonly used words in literature, newspapers, business letters, and family correspondence has been the basis for many subsequent spelling books, readers, and tests.[4] The words are arranged in columns according to the percentage of frequency with which children of the different grades can spell them correctly. Horn produced a list of the ten thousand words most frequently used in adult correspondence, which was drawn from a count of more than five million words.[5] The most thorough investigation of current words met with in general reading is that made by Thorndike and his collaborators, the results of which were published in his *Teachers' Word Book.* The introductory paragraph of the foreword of the 1931 edition shows its nature and origins:

The Teachers' Word Book was originally [1921] an alphabetical list of the 10,000 words which were found to occur most widely in a count of about 625,000 words from literature for children, about 3,000,000 words from the Bible and the English classics, about 300,000 words from elementary school textbooks, about 50,000 words from books about cooking, sewing, farming, the trades, and the like, about 90,000 words from the daily newspapers, and about 500,000 words from correspondence.

The 1931 edition increased the number of words graded for frequency to twenty thousand, the 1944 edition to thirty thousand.[6]

The word lists have been employed effectively in the selection of words for books used both at the elementary and the secondary level. It should be pointed out, however, that frequently-used words do not

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[3] William S. Miller, *A Critical Analysis of the Vocabulary of Ten Third Grade Readers,* Master's Thesis, Iowa City, Iowa, College of Education, State University of Iowa, 1925.

[4] Leonard P. Ayres, *A Measuring Scale for Ability in Spelling,* New York: Division of Education, Russell Sage Foundation, 1915.

[5] Ernest Horn, *A Basic Writing Vocabulary,* Iowa City: University of Iowa Press, 1926.

[6] E. L. Thorndike and Irving Lorge, *The Teachers' Word Book of 30,000 Words.* New York: Teachers College, Columbia University, 1944.

necessarily have a simple meaning in context. Generations have pondered the phrase "to be or not to be," and the monarchical "I am the state" still has overtones that are not too well understood.

Word recognition. There are two steps in word recognition, each of which is of utmost importance. The first is to pronounce a given word when it is seen, and the second is to recognize it as a symbol for some meaning. If the first step alone is taken, necessary as it is, the result is mere mouthing or verbalizing. Frequently, however, if pupils can once pronounce a word, they recognize it as one they have heard before and know the meaning of, perhaps as one they use themselves.

A number of schemes have been employed to aid pupils in this first step in word recognition, involving sounding out the parts they know— the initial letters, main parts, or separate syllables. As compared with a phonetic language like Italian, in which each letter has its own sound, English presents many difficulties in this respect, but nothing like those of Chinese, in which there is no relation between the symbol and the sound of the word for which it stands.

Another device involves the second step. This is to guess at what the word is from the context. Both methods are useful not only for the beginning reader in his native language but also in reading a foreign language. Egregious errors may be made but the reader can often get pretty close to the meaning of many words when both sounding and context methods are employed.

Contributions of Linguistics. Discrimination of small unit differences is very important not only in reading and spelling but also in *English composition.* Abilities in this area are sometimes tested by requiring the subject to indicate the errors in incorrect forms, as in the following example,

"I wonder," said I to myself, looking at the Broadway crowd, how these kind of men would respond to the type of salesman whom I know make a hit in the middle west . . .

Diagnostic tests of English composition reveal that mistakes in the case of pronouns are least frequent, while failure to express clear meaning and mistakes of punctuation are most frequent. A most amusing study of the errors found in the letters addressed to the "Voice of the People" in a metropolitan newspaper revealed that, in the 362 letters scored, the "People" made a total of 7,110 errors, or one every fourteen words!

It is hardly necessary for the schools to put on sackcloth and ashes over

such results, for among the authorities the purist and the radical would each blue pencil the punctuation and grammar of the other. Usage is flexible and the borderline between correct and incorrect is not sharply drawn. And yet there are canons of good usage founded for the most part upon the convenience of uniformity and upon clarity and beauty of expression which those who profess to be even partially educated can hardly neglect. As the child matures, the desire and the need to say more things increases the possibility of errors over that of the early days of the simple declarative sentence. Formal grammar has been vigorously applied to stem the rising tide of error, but all too ineffectually.

Improvement can hardly be expected in *spoken English* above the level of the home and school, or in written English beyond the point of recognized need. The virtual illiteracy of great numbers of high-school students is viewed with alarm by their teachers, but proper methods of instruction will remedy many of the ills which the tests disclose.

The reasons for the ineffectiveness of instruction in formal grammar are to be found in the nature of the English language. Though it is not an inflected language, the grammarians have copied the forms of the inflected classical languages and have tried to crowd the living forms into outworn molds. Grammar has been overdone in the schools to the exclusion of the science of linguistics, which for a number of years has been evolving the laws according to which usage develops.

It has been pointed out, for example, that many of the pupil "mistakes" which bedevil the English teacher are surviving forms from older periods of the language and many are found in Chaucer, Shakespeare, and the King James version of the English Bible.[7] Among these are the double negative, which gave emphasis, and irregular verbs that have become regular (clumb for climbed). Furthermore, on the basis of the usual grammar, the child must somehow know the meaning first, which makes the grammar seem rather useless as an aid to understanding. For example, in the familiar illustration, "The boy hit the ball," the pupil has to know from his experience with the language which got hit. Then grammar steps proudly forward and gives confusing names to these and other parts of the "sentence." The child is not taught, as he would be if the teacher or the textbook employed the findings of linguistics, how the structure of the English language, without inflected forms, reveals its meanings. The result is that most of the time spent on grammar is wasted, since it can give little help to pupils in their understanding and use of

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[7] Charles C. Fries, "Implications of Modern Linguistic Science," *College English*, vol. 8 (March, 1947), 314–320.

the language. And in addition it is positively harmful to the extent that it repels them by its complications and seeming futilities.

In the study of *foreign-language forms* the perception of seemingly small differences in spelling and word endings is particularly important and must be given needed emphasis in instruction. The correct translation of inflected languages depends on word forms much more than does English, for these, rather than word order, give the key to meaning. Too often they are emphasized in classified, paradigm form only, quite out of context, instead of being learned in the relationships in which they are used.

For spoken language, linguistic studies have emphasized the importance of phonemes and language intonation. A phoneme is a language sound that is usually spelled in the same way but undergoes slight variations in pronunciation often according to the sounds that precede or follow. When the different variations of sound do not serve to distinguish meanings, we do not notice the differences. The Spanish, for example, do not use the *s* and *z* sounds to distinguish meanings as we do (niece, knees), so it is hard for them to perceive these different sounds in learning English. The other way around, we do not distinguish meanings on the basis of the broad *a* sound (as in *far*) as the Germans do (*Stadt*—city and *Staat*—state), nor do we distinguish different *r* sounds as do the Spanish (*pero*—but, and *perro*—dog).

The intonation or variation in pitch of a language is almost never taught, save in such languages as the Chinese, in which it gives quite different meanings to the same word. As a rule, only native teachers have correct intonation, and then pupils are apt to learn it if they are successful mimics. Often the foreigner's pronunciation of separate words is quite correct but the peculiarities of pitch and intonation which he carries over from his native language render his speech well-nigh unintelligible. The student who is learning to speak a foreign language needs to be able to perceive the phonemic and intonation sounds if he is to approach a mastery of the language. It has been demonstrated that, when these matters that are usually neglected are emphasized, remarkable progress can be made.

Identification of Larger Symbolic Patterns. In the preceding section, emphasis has been given to unit symbols, such as letters and sounds in the pattern of words. In this section, we shall emphasize the word symbols in the larger pattern of word groups. Earlier educational procedure, following the generally accepted principle of proceeding from the simple to the more complex, began instruction with letters, went on to

small words, and thence to larger words, from short sentences to longer sentences, and from number combinations to arithmetic processes. This principle is essentially sound, but in practice it runs head on into another equally sound principle, that of beginning with the familiar and developing experience concomitantly with the symbols employed to represent it. For example, it often happens that small words (e.g., erg, lie, just) represent rather complex meanings or high-level abstractions, while the meanings of large words are often acquired even before children come to school (e.g., delicatessen, airplane). The practical difficulty is clarified by the theory of the structure of experience. Meaning and understanding are based on familiarity with the relationship of parts. For example, the city child has been taken to the delicatessen store with his mother, has seen her buy food there, has eaten the food, has been sent on errands there himself, has talked to the proprietor, and the like. He knows the kinds of things that are for sale there, and wouldn't go there for nails or shoes. The learning of the word that applies to this store is incidental. In school, however, learning is likely to be the other way around. He learns the word, but he has not had the experience to make it mean much. Hence the verbal learning involved is dull and uninteresting. It is just learning words, parroting phrases which have little or no significance. Let us see how the realization of the importance of the perception of various patterns of experience has tended to modify learning procedures.

First, let us consider *spelling* again. It could well be argued that the spelling of a word is the least important thing about it, as compared with its other aspects. How would the spelling class differ if it became one in *word study?* There is, for example, its etymology, an interesting exploration at any age level. The word tractor, for example, has various possibilities not only with the familiar words traction and extract, but as a foundation for more generalized derivatives like abstract and detract.

Then there are the dictionary meanings, for the dictionary should be thought of as more than a source of information on correct spelling and accepted pronunciation. The various derived meanings serve to give a fuller understanding of the significance of a word, one of the values that may also be obtained from the study of a foreign language. For example, the various meanings of homonyms like fix, band, discipline, and faculty provide opportunities for interesting explorations. Growing out of this is the fascinating study of synonyms, with the fine but often important distinctions in meaning between them. The more alert English teachers emphasize diction or choice of words in the compositions that pupils write. Did John merely come across the street, or did he hasten, run, walk, scamper, toddle, shuffle, skip, or dash?

But these are all verbal matters, though presumably within the experience of the pupil. How is the experience to be built up? The child may know about the delicatessen store, but does he know about the bakery, the fire house, the printing establishment, the fish hatchery, the machine shop, and, at a later level, the city engineer's office, the police court, the detention home, the public health services, the board of supervisors, and the board of education? If he does, he won't have to learn just words, he will learn about things and the words will come naturally when the experiences are discussed and written about. And the words he reads will have meaning.

Available experiences can be augmented by the use of slides, film strips, motion pictures, and recordings. If instruction leads up to these, as well as to trips and excursions, and if they furnish the basis not only for discussion but for reading and for writing, the dry bones of word learning become clothed with living flesh. The movement to reduce the vocabulary load of the school subjects by limiting the words in the textbooks to the first two or three or five thousand, and so on, is a commendable one, since it reduces the frustration and promotes the learning of the pupils. But a corresponding effort should be made to provide experiences that will increase the number of words the pupils know and understand.

If one desires the formula by which meanings are acquired, it is that of concomitant variations described in the chapter on perception. Different situations in which the object or condition appears (or does not appear) in varied forms and relationships are experienced. It is the same principle, whether the concept is as relatively simple as "round" or as complex as "justice." Unless pupils have had these varied experiences, instruction is futile. If they have had them, relatively little instruction is necessary. It is the function of the school to provide these experiences, not in connection with any one subject, but with all subjects and activities.

4. Associating Word-Symbol and Response

Selection of Content. Pupils, like other people, are expected to make appropriate verbal responses to the language symbols. It has been emphasized that a symbol or combination of symbols must first be seen, or heard, that is, it must be perceived and recognized for what it is. When this is accomplished, the proper response can be associated with it. When this is done, the pupil has "learned" something, at least for the time being. But the next day, he may not be able to make the correct response. He has forgotten.

The teacher knows, however, that this is to be expected. It is the way minds work. There were other details the child was supposed to learn that day; this is but one of many. If he could remember them all, the services of teachers could largely be dispensed with. Since he cannot, the teacher will be expected to draw on his psychological knowledge and technical skill to the end that the child will be able to make the right response the next day, and the day after that, and even the day after their final examination!

But first, it should be emphasized that what is selected to be learned should be of real *value* in attaining the educational objectives sought. Learning is a slow and laborious process, and there is not time to learn everything. Therefore, wise choices should be made of what should be remembered. There are minutiae that are still insisted on by many teachers that pupils spend valuable hours learning, some of which are quite useless, some quite untrue, but harmless, and some positively detrimental. Thorndike has shown—if it needed showing—that people can acquire meaningless or false information when they know it is meaningless or false with almost the same facility with which they can learn useful and true material.[8] The teaching profession should be on its guard not to take advantage of this tolerance of the human cortex.

If a pupil asks, "What's the good of my learning that?" the teacher will do well to take the question seriously, and not berate the pupil for presuming to criticize a curriculum that is not sacred even though it may have been compiled by men supposedly wiser than he. The teacher might better ask the question himself, before the child gets a chance. While there is little in any school subject that is not of interest or value to someone, this is no reason for supposing that everything in it is of value to all.

A second criterion of selection relates to the necessity for *mastery* of the several items deemed valuable. Is it necessary for the pupil to learn this item now, finally, once and for all? Or is an introduction sufficient for the present, since he will meet it again and again and will gradually come to know it? This question is not easy to answer. But it is known that children learn to spell many words that are not in the course of study, that they pick up pronunciations and meanings of words at home though they have not been drilled on them. Later reading and discussion, and later experience may be expected, through repetition in various contexts, to increase the probability that the correct response will be made when the stimulus is presented. Thus it may be

[8] E. L. Thorndike, *The Psychology of Wants, Interests and Attitudes,* New York: Appleton-Century, 1935, pp. 108 ff.

said that associative learning is gradual, developing through use over a period of time.

Thirdly, attention should be given to the *kind of response* that is made. Responses may be made purely on the verbal level. Words can be connected with words, and with more words, without any of them having any more meaning than nonsense syllables. Children can learn to repeat definitions and sound as if they knew what they were talking about. Definitions of parts of speech may be taken as examples. How many children have received good marks for parroting such phrases as "A word that asserts is called a verb," or "a word that expresses action, being or state of being," without the least idea of what they meant! They can memorize geometric demonstrations without understanding them. They can tell about the structure and function of organisms or of machines without being able to recognize the parts if they saw them, or being able to do anything with them if they did recognize them. They do not do this shallow verbalizing of their own accord. They are forced into it by exacting teachers who believe in "standards," or who are compelled to "cover" the course of study. Such "learning" should be avoided whenever it is humanly possible.

Memorizing. But there still remain many responses pupils must make to many symbols, responses they will not pick up incidentally, but which are useful or even necessary to acquire, are not on the verbal level only, and are understood well enough. There are time and place relationships in history and geography, there are number combinations, mathematical processes, scientific principles, technical terms, and, most burdensome of all, foreign-language vocabularies, including idiomatic phrases. How shall these things be learned?

The answer is to be found in the principles of associative learning which apply alike to the natural and social sciences, to languages and mathematics. They may be advantageously reformulated here:

1. *Motivation and set.* Create and encourage the desire to learn by participant situations such as projects, laboratory and shop, by questions and problems, multi-sensory aids, adapting to individual interests and needs and developmental levels, and by enthusiasm and personal charm, or any other legitimate means an ingenious mind can devise.

2. *Perceptual and conceptual framework.* Present the data, whatever they are, not as isolated verbal items, but in a context that is meaningful to the learner, as part of a rich background of related experience.

3. *Exercise.* Repeat again and again, not only patiently but cheerfully, remembering that repetition is necessary even to condition the

salivary reflex of a dog! Repeat not only by presenting *a* and asking for *b*, but the other way around, presenting *b* and asking for *a*. This applies, for example, to number combinations (8 × 6 and 6 × 8) and to word meanings (*nach* = ?; toward = ?). For these, the use of slips of paper with one item (foreign word) on one side and the other (English word) on the other side constitutes a useful device to avoid the false cue of position in a list.

4. *Reinforcement.* Induce the confirming reaction on the part of the pupil so that he can himself know when he has made the correct response. This may be done by the teacher's saying "Right," in any one of a number of different ways, or, when possible, by the pupil's own realization that it is right because the problem is solved or the sentence has meaning.

5. *Relearning.* Review from time to time after the response has been "learned." Otherwise, with the passage of time and the inhibiting influence of other learnings, the correct response will be forgotten. The review, like the earlier repetitions, should preferably be in the context in which the item is used, but for special drill it may be temporarily taken out, providing it is put back in again!

These are the processes by which things are learned, by which knowledge is acquired. In many instances they may be shortened considerably. But when "facts" are not remembered, it is because there has been failure somewhere along the line of these five processes.

Foreign Languages. The mastery of a foreign language is beyond the range of school instruction. But an excellent base can be provided for further study and considerable facility developed if sound psychological principles underlie the methods employed. Pupil motivation in this country has been slight because of the low probability that the language studied would ever be used. But the movement in the direction of world unity and the development of air transportation have brought distant lands closer. Foreign languages as communication skills and learning about the culture of the foreign countries can be used to supplement each other in order to provide knowledge and understanding. Perceptual and associative factors of foreign-language instruction have already been discussed, but the question of what perceived elements should be associated calls for special consideration.

First we may consider the association of the native word with the foreign word. This is the common vocabulary method of learning a foreign language. For example, *das Buch* or *le livre* means the book. More and more symbols are thus associated, and translation gradually becomes possible by a process of symbol substitution. But one must

get the words of a passage into the words of his native language before he can understand the meaning. If a language is learned in this way, conversation is slow and labored because the individual must recognize the spoken instead of the written symbol, he has to think what it means in his own language, and then, if he is to reply, he must reverse the process and think what the foreign word is for the native word he wishes to use, and likewise recall and apply the rules he has learned about gender, number, and case, and the paradigms of regular and irregular forms.

But there is a further disadvantage to this traditional method of language instruction. Learning meanings is not actually a mere process of symbol-substitution. A word in one language seldom has exactly the same meaning as its equivalent in another. In one context, one foreign word would be used, in another a different one.

The impossibility of translating merely by substituting the foreign for the native word, and the consequent difficulties for the beginner, are dramatically documented in a study of the vocabulary and meanings of the words in primers prepared in the United States that are used in Puerto Rico.[9] The different words that would be used in Spanish for the familiar English word "go" (without including various irregular forms) are shown below. The words in the primers are in the left column, and the Spanish expressions in the second:

Away we go	nos vomos
See Dick go up (the tree)	... subiéndose
The boats go	... salen
He will go to sleep	... se quedará dormido
When you go back	... cuando vuelvas
Did it go over	¿Pasó por encima?
(It) could not go	... no podia seguir anando
(See me) go	... correr
(We) can go to work	... podemos empezar
We will go (for a ride)	daremos ...

It sometimes seems to the beginner that a single foreign word often means a great many different things, and this is true, but there are homonyms in his own language too. And more than this there are the connotations, the overtones that differ in different cultures. For example,

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[9] Pauline M. Rojas, *A Critical Analysis of the Vocabulary of Three Standard Series of Pre-primers and Primers in Terms of How the Words Are Used*. Thesis, University of Michigan. Ann Arbor: University Microfilms (Microfilm Abstracts VII, 1, Publ. no. 769), 1946, pp. 87–88, 113.

such words as mule, goat, hog, and doghouse can be translated directly into almost any language but there are subtle differences in their figurative meanings.

Such difficulties suggest the desirability of getting more direct access to the experiences which the words symbolize. In learning his native language, the child naturally learns names for more or less familiar experiences, and it has been emphasized that this process should be continued during his schooling. The same idea is followed in the direct methods of foreign-language instruction. The teacher, for example, holds up a book and says, *"das Buch"* or *"le livre."* The learner, by associating the experience and the symbol for it directly, without any other verbal intermediary, tends to acquire the language in the same way that he did his native tongue. Gradually conversation becomes fluent, and he is able to read the foreign language and get the meaning directly without putting it into his own language first. If his object is to translate, he may have difficulty because he hasn't thought about what some of the meanings are in his native tongue. A traveler who spent some time in Germany, and who had enjoyed what she there learned to call *Linsen,* could not think of the familiar English word "lentils" when she wished to purchase some on her return home.

The conclusion seems to be that one learns to do what one does, and that whatever method is employed in learning a language, whether one's own or another, the repeated association of what one wants to associate, with appropriate satisfactions, will result in learning. However, the closer one can keep to the actual objects and meanings symbolized, the more efficient and effective the learning. Thorndike's statement seems to apply equally well to native and foreign-language learning when a certain degree of competence has been attained:

> The actual learning of meanings is probably best accomplished by a large amount of relatively easy reading, plus a much smaller amount of harder reading with recourse to the dictionary, plus a still smaller amount of specific teaching of meanings as such.

Though many psychologists have learned foreign languages, few have studied their rate and progress of learning. Swift[10] took up the study of Russian because its different origin would eliminate the etymologically familiar words coming from Latin and Germanic sources. His investigation took the form of a half-hour's study of two beginner's

[10] E. J. Swift, *Psychology and the Day's Work,* New York: Scribners, 1918, pp. 142–143. By permission of the publishers.

books followed by a fifteen-minute test of translation continued daily for two months. Progress was measured by the number of words translated. The resultant curve (Figure 68), in spite of the irregularities
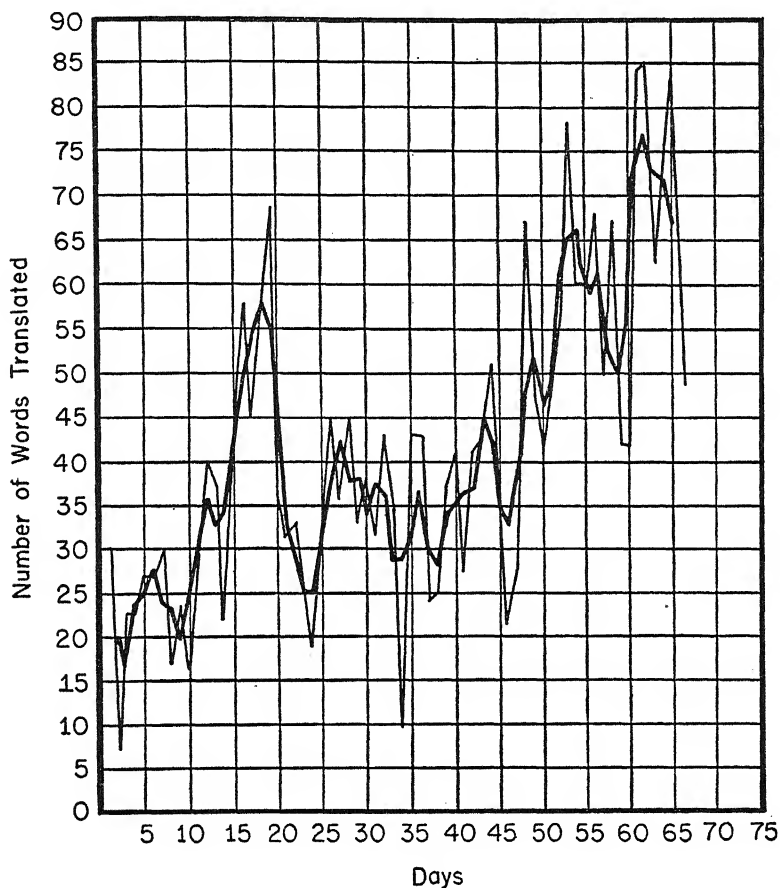
Figure 68. Progress in Learning Russian The heavier line is a somewhat smoothed curve.

in the difficulty of the task from day to day, resembles somewhat the curves found in other types of learning.

Structuring and Restructuring. Whether one translates a language or gets the meaning directly from the symbols without using intermediate terms, the process is more than a piece-work addition of words, even

though the number of the latter employed may be used as a rough index of progress. Instead, the process is better described as structuring —a continuous molding of the structure of meaning.

As an illustration, let us take the following sentence: The old man presented a battered appearance with his shaggy beard, his ragged tunic and worn-out boots. As one reads this sentence slowly, the appearance of the character gradually emerges, but the figure will be quite different for different readers in different countries who are structuring their own experiences with battered, shaggy, tunic, and boots. A word like tunic may not mean much to many readers, and a dictionary may be needed for a fuller explanation.

Suppose the next sentence reads: He examined our papers and motioned us to a small enclosure where a huddled group of disconsolate people were waiting. The structuring continues but the reader has learned something that doesn't fit in with his experience. The battered old man was not a bum, he was an official. But officials wear blue uniforms, and perhaps carry a shiny punch to make little holes in railroad tickets. Some officials, however, apparently don't wear uniforms and look like bums. The reader goes through a process of restructuring his mental content, of reclassifying and rearranging his concepts of officialdom to include a more varied assortment of characters.

The process of structuring and restructuring is an on-going one of which the reader may not be wholly aware. And, though usually much more rapid than the analysis of this little illustration, it is seen to be a living, organic process, instead of a mere successive addition of words. Description in terms of structuring and restructuring is therefore much closer to what actually occurs, although the separate words and their meanings are parts that go into the making of the changing, on-going whole. The nature of meaning can properly be more fully explored.

Language and Meaning. Language is more complicated than the substitution of a symbol for an object, and meaning is more involved than the substitution of a logical definition for a symbol. Language as a system of meaningful symbols may be viewed as naming, as stimuli that produce responses, and as symbolic patterns. The first, *naming*, refers to the simple associations as the one between the word "cat" and the animal so designated. But even this becomes more complicated and the abstraction of the "object" more difficult in the case of such words as "is" and "against." The symbol, by its repeated use comes to arouse definite bodily *responses*. In fact, one of the chief functions of language is to get action, its pragmatic function, as previously

described. When a person says "Come here" or "Do as I say," it is not an analysis of the meaning of words that follows, but a definite change in the behavior of the person addressed. Teachers use language for this purpose continually, and some are more successful than others in getting the kind of action that is most effective. One definite finding, though it has long been suspected, is the superiority of positive over negative directions. The latter act like punishment and block action, with the result that the ensuing behavior may be equally wrong or inappropriate. Positive directions, on the other hand, open the route to desirable action.[11] So "Please do" largely takes the place of "Don't" and disapproving frowns; and "Now we'll put the shavings in the basket" gets better results than "Don't leave this mess around."

The behavioral response to language may be employed to induce people to buy products they don't need and support causes that should be allowed to die. The advertiser's testimonials may be given by people who are paid for them, or by those who have been cheated and don't know it. They may bear no relation to the quality of the product they extol, but they help to sell it. The confusion arises from the fact that the same word has different meanings to different people, i.e., from its semantic character. It may even be correctly used to denote different things, but it may connote many more. "Fightin' words" occur in all languages. "You are a liar!" means that an individual asserts that another has intentionally employed an untruth; but it is also likely to mean a fight. "Our honor as a people," "living space," "communist," "freedom of speech," "our duty is clear," "the democratic way of life"—such phrases as these and dozens more have been employed to get action through their attitude-arousing connotations.

The fundamental function of language is to convey meaning, whether it is used merely for self-expression or more specifically for purposes of communication or to get action. It is a system of *symbolic patterns* which roughly correspond to objective phenomena as apprehended, and to subjective experience. The empirical data may be spatial, temporal, or space-time patterns. They are thought of as reality, like a tree, a pain, or a football game. The words are the counters that are moved about in various ways and represent these realities of individual experience. They represent them adequately only at the cost of constant vigilance. Such phrases as the following at different levels of intelligence and integration reveal some of the difficulties encountered in making the patterns of words and of reality correspond:

[11] M. W. Johnson, *Verbal Influences on Children's Behavior*, Ann Arbor: University of Michigan Press, 1939.

"Oh, is that what you mean? I thought you meant . . . "

"No, I didn't get the joke; I was thinking of . . . "

"Yes, I was taken in by his fine talk and didn't realize that . . . "

"The formula, therefore needs to be revised since the equation as formerly written did not take into account . . . "

"Yes, I was in bad shape; the slightest word made me burst into tears, and I took the kind words of friends as signs that they were plotting against me."

Much valuable time—though probably not enough—is spent trying to find out just what writers and speakers really mean; and certainly more time and effort should be expended in developing the ability to use language with precision. One encounters weaknesses of all sorts: language that means nothing; language that means something but not what the writer or speaker intended it to; language that means two or more things (equivocation); language that means one thing but strongly implies another; and language that means one thing to one person and another to another. Precision is not attained readily, and there are few indeed whose command of language is so perfect that there is no room for improvement.

5. THINKING AND PROBLEM-SOLVING

What Is Functional Instruction? In the discussion of the communication skills, it has been pointed out that instruction aims to be more functional than heretofore. This means that modifications of procedure are in the direction of bringing the school subjects more in line with pupil experience and making them more applicable to the needs of everyday living. The contrasting form would be "structural," though the word usually employed is "formal," and refers to the systematic organization of subject matter. Examples of formalism would be the teaching of spelling lists, perhaps based on the word groups, instead of teaching the child to spell needed words; the use of reading exercises instead of teaching him to read social studies, science, arithmetic problems, and so on; emphasis on foreign-language vocabulary lists, conjugations, declensions, and grammatical rules, instead of teaching him to use the language as in the direct methods of instruction; drill on multiplication tables and artificial "examples" instead of giving him arithmetic problems used in making change, shop work, and the like.

Functional instruction provides experience in relating the work the pupils do in school to the ordinary tasks and problems one continually encounters. It makes solutions more *available* when needed. It reduces

their *fixedness* when they do not have to be lifted out of another structure, that is, out of formal organization in which they are imbedded.

Functional instruction is then a first step in helping pupils to learn to think, to solve problems. It applies equally to the so-called content subjects, to the natural sciences, and to the social studies. There are hundreds of concepts and thousands of facts that might be taught. Selection can advantageously be based in large part on what will help the pupils to understand the natural and social world of which they are a part.

There should be no conflict between this point of view and that of the subject-matter specialists who maintain that it is desirable for the student to know a subject. Euclidian geometry, for example, is a carefully worked out system of spatial relationships based on a set of axioms and postulates which hold in ordinary terrestrial measurement, each step derived logically from the preceding. There is a certain esthetic charm in its perfection. The natural sciences are similarly logically arranged structures made up of concepts which provide a pattern for the inclusion of factual data and techniques, and for the discovery of previously unknown aspects of the pattern. The same is true of the social sciences, though the conceptual framework is far less precise.

For students who are capable of grasping the concepts and comprehending the relationships with natural and social phenomena, and who study the subject over a long enough period of time—say four or five years—to gain a real understanding of the subject as a whole and of many of the details of its parts, such training may be truly functional. For those who are not capable of dealing with the complexities involved, or who will take only a course or two in the subject, the formal approach is rather futile. So much effort is required to comprehend the details of the system that little time is left to relate them to the on-going experience of the individual. The formal approach may even be harmful because of the frustrations and antagonisms that are likely to be aroused.

The schools have employed various means to make instruction actually function in the lives of the pupils. A first step is, of course, to adapt it to their level of ability. But this is not enough if it is merely a simplification, or perhaps an oversimplification, of the same system of facts and principles. A second step is to illustrate the principles not only in the traditional textbook and laboratory way, but through actual, meaningful examples, activities, and projects. Geometry presumably got its start in the measuring of portions of the earth's surface, and its principles still hold in lining out a chicken yard, a

garden, or a tennis court. Heat conduction might be studied in building materials as well as in an iron bar in the laboratory. The third step involves a virtual abandonment of the systematic organization of subject matter and substitutes in its place a selection that is actually based on the interests and needs of those in the ordinary walks of life. When these efforts are successful, pupils learn, for example, about patent medicines, public health measures, electrical appliances, local government, tax forms, and insurance policies. They will have to deal with problems in such areas anyway, and will as a consequence of their instruction be able to deal with them more intelligently. The misfortune is that those who follow the traditional path of formal instruction may never proceed far enough in certain directions to derive the expected benefits, and they also miss the functional approach developed for those who take the other path.

Mathematics. In spite of the formal organization of mathematics, a functional approach is coming to be more generally accepted since it serves as an instrument in the solution of problems, namely, those involving relationships of number and space. But opinions have long varied as to the best ways of developing the abilities of pupils to handle such problems. Following the doctrines of faculty psychology, some have urged that training the mind to think is an important educational goal; and, since mathematics requires thinking, it supposedly provides an excellent means to this end. As a consequence, therefore, the pupil would be able to solve not only mathematical problems but other kinds as well. As has been indicated earlier, the blind faith in this kind of automatic transfer has largely been dissipated. True, those who do mathematics well often do other things well, but the reasons for both kinds of success, as has been shown, lie in some more basic condition, such as the native intelligence of the learner. Traditional ways change slowly, however, and even now one will find people supporting the discredited doctrine that mathematics provides good training for the mind, particularly for the minds of those who don't like it. Even some who themselves have supposedly had their minds "trained to think" by studying a great deal of mathematics often overlook the negative transfer effects in the form of habits of deception and evasion and other frustration phenomena, to say nothing of the aversions that may spread to the whole school experience.

Perhaps the chief objection to mathematics as traditionally taught lies in its *formal organization*, which, for many, constitutes its chief charm. Formal subjects are reputedly easier to teach, though the instruction is apt to be poorly motivated and verbalistic. Opposing the tradi-

tional approach is a functionalism that relates the subject to its practical uses. In this country, Benjamin Franklin early saw the value of mathematics for the surveying the New World would need. And since his day the development of Western culture, scientifically, industrially, and commercially, has emphasized the need. Since farmers, bankers, and parents, in general, use relatively little arithmetic, such subjects as alligation, cube root, and complex and compound fractions are being omitted, while equations, graphs, and simple formulas are being borrowed from algebra and the construction of simple figures from geometry. The methods of instruction have been revised in consequence of the principles of motivation and follow the needs of the child in the home and the community through the medium of plays, games, dramatization, and practical tasks. The useless and ridiculous problems are being dropped, and those which are included, as well as the "exercises," furnish drill on the particular tasks or operations to be performed.

A part of the instructional difficulty lies in the wide *individual differences* of the learners. Even mildly complicated mathematical processes are not mastered by a large proportion of the children through the usual methods of mass education, and for pupils to profit from the usual formal high-school courses an intelligence quotient of around 100 is recognized as necessary. The futility of trying to put dull normals through these courses has at last become apparent, though they present little difficulty for the superior who will go on to higher levels in college. For the others, correctional or remedial instruction with close relationship to practical problems of the everyday world is indicated.

While the symbols and concepts employed in mathematics almost constitute a language in themselves, it is a language which, except for a few of its simplest forms, is not used in ordinary conversation. It has to be learned. So far as the perceptual processes are concerned, one does not have to watch for inflections and intonations. Instead, unit symbols must be noted—signs, dots, numerals, and, unlike the letters of familiar words, they must be given individual attention. It is necessary therefore to read slowly that each significant part may be rightly perceived. But this is not all. These parts must be perceived in their proper pattern of interrelationships. When this is not done, pupils may start adding or multiplying whatever numbers are in sight until finally by chance they may get the answer that is on the key or in the back of the book.

It has been noted that children first acquire the meanings of words in their mother tongue before they learn to read and write them, and that the effort is often made to provide the same kind of preliminary experi-

ence with the words of a foreign language. It has taken longer to apply this principle in teaching the mathematical language of quantity and space. Children quite early learn to use such words as "big" and "little," "more than" and "less than" (especially when they get the smaller piece!), and "half of" and "twice as big." It has been found that when these experiences are gradually extended before computations are demanded, the understanding is improved, and computation is more meaningful. When this is not done, such questions as "Do you multiply or divide?" confound the teacher and indicate the futility of formal computational drill without an understanding of the relationships involved.

Then, too, there are vocabulary difficulties. A large number of technical terms are introduced with which pupils are unfamiliar, and which are often explained hurriedly or not at all. Such terms as altitude, prime factor, mixed number, invert, per cent, ratio, equation, external angle, commensurate, logarithm, and abscissa, to mention only a few, may mean little unless care is taken to enable the pupil to abstract the conceptual pattern of relationships for which the words stand.

It becomes clear that learning to manipulate quantitative symbols, either numerical or verbal, involves the use of the principles of associative learning discussed earlier. Apart from mathematical problems, the chief difficulties are found in automatizing the fundamental processes in arithmetic and in learning the technical vocabulary. Drill on the former, in some schools, has been neglected because of the belief that children shouldn't do anything they don't like to do. While it is probably true that the number combinations have been taught to children who were too immature to use them intelligently, this does not imply that they should be omitted. Progress is rapid when the need is realized, and effective drill methods can be employed to motivate such learning.

Skill in computation involves a speeding-up in the making of associative responses. Any one of the number combinations, for example, $9 \times 3 = 27$, is presented and later, when either member of the equation, that is, when either one of the contiguous parts is presented alone, the response will be the other part, even though one calls for "multiplication" and the other for "factoring." Repetition and reward strengthen the response, that is, increase the probability of its being made. And if the probability isn't 100 to 0, there may be a "mistake." When dozens of such perfect responses are demanded in record time, it is obvious that a great deal of practice is necessary to reduce the errors to zero. Some methods of proceeding are better than others, and various schemes of checking should be taught, since in real life

mistakes are often embarrassing if not costly. But the process is a mechanical one which simple machines can perform. It is not mathematical thinking, which most are agreed is more important educationally.

In contrast with the automatic response taught by drill and still more drill, some are advocating a reasoning-out process similar in the single-digit number connections to what people employ with larger numbers. For example, if you were required to add $1.24 and $1.44, you would probably not be able to give the answer automatically at once. Instead, you would probably go through some such process as 1 + 1 is 2, 20 + 40 is 60, 4 + 4 is 8, $2.68. Similarly, a young child might obtain the sum of 8 and 5 by saying 8 + 2 is 10, + 3 is 13. Or again, doubles are easy (7 + 7) but combinations like 7 + 9 are hard. If the child learns to say 7 + 7 = 14, + 2 is 16, he has the ability to add understandingly, though perhaps with reduced speed, but he is less apt to make mistakes. Or he might learn that 7 + 9 = 7 + 10 (which is easy) minus 1, or 16.

There is much to be said for this procedure, not only in addition, but in the other number combinations as well. If a person is doing a great deal of computing day after day, the processes become automatized. But if he uses these skills only occasionally, as most people do, he is apt to forget what the right answers are. However, if he knows how to "figure out" what the answer is, his skill remains fairly intact.

While much practical thinking, on its lower levels at least, deals with actual things, mathematical thought is carried on in symbols farther removed from reality. In geometry, when an actual triangle may be figuratively, or a model actually, lifted up and superimposed on another, one partially escapes the trials of symbolic thinking, but even here the pupil is supposed to realize that it is not just this triangle but any triangle that is thus moved. Arithmetic got its start on the fingers and toes, the origin of the decimal system; then came tallies or counters which were also things representing something else, but things nevertheless. The abacus with its small spherical counters sliding on wires aided in this sort of computation. But with the introduction of digits, zero, and in algebra the further symbolization of any number by means of letters, soon to be followed by negative numbers and imaginary numbers such as $\sqrt{-1}$, the distance from the actual world of reality increased, and mathematical reasoning became the manipulation of these symbols, a language within a language.

Some mathematical reasoning is deductive rather than inductive. In geometry, for example, a proposition is stated as a previously derived principle, and the problem is to answer the question "How is it derived?"

Or perhaps more exactly, given certain conditions, can it be shown that such and such other conditions will be found? One accepts the premises and must determine whether a given statement follows from them. This is the process of trying out the solution to see if it works, that is, holds true, or is in agreement with the known facts. Undoubtedly, this experience of checking propositions on the basis of the known facts in plane geometry can be furnished in such a way as to be very valuable, but it can be taught quite formally so that the learner merely memorizes the demonstrations or evades the task instead of developing habits of delineating perceptual patterns, noting their characteristics, drawing inferences, and arriving at conclusions.

The superposition test illustrates the processes of mental manipulation of spatial forms.[12] A sample follows:
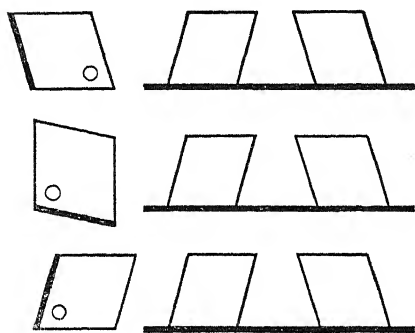
Directions: Suppose that the figure with a small circle in it is a small card with one of its edges painted black and with a hole in one corner. If this card is moved around so that its black edge lies upon the long heavy black line, it will fit one of the two figures shown. Decide which it fits and then with your pencil draw a circle where the hole would be.

In the same test of mathematical ability appear two-word completion tests (Trabue language scales), a number-series completion, and a logical category test in the analogies form. Deductive processes are followed in the geometry test:

Given: The triangle is isoceles and angle A = 30 degrees.
　　　　How many degrees are there in angle B? State reasons.

Manipulation of number and letter symbols is tested as follows (algebraic computation test):

8. If y stands for the number of years in a man's age, how old was he 5 years ago?
Answer . . . . .

[12] *Rogers Test of Mathematical Ability*, Bureau of Publications, Teachers College, Columbia, 1921. The examples which immediately follow are taken from this same test, and represent forms used on later instruments.

Much of the testing and instruction in mathematics is on the verbal, associative level. Pupils learn, for example, to demonstrate the fact that the area of a parallelogram is the base times the altitude without comprehending the structural relationships involved.[13] The figure is neatly drawn, its base a horizontal line considerably greater than its altitude. They can proceed, as they have been taught, to "drop a perpendicular from the upper left corner, and another from the upper right corner, and extend the base to the right." However, when they are given a figure differently shaped, they proceed in the same fashion and become completely confused (Figure 69). Those who comprehend the structure or the principle involved are able to find the area of a trapezoid themselves, while the others continue to follow the original set blindly and hopelessly (Figure 70).
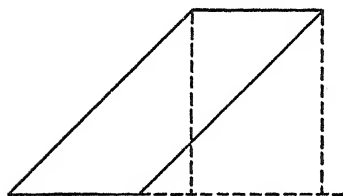
Figure 69.   Area of a Parallelogram   *Figure 70.   Area of a Trapezoid*
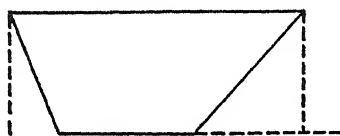
It is true that the teacher of mathematics needs to know more mathematics than most such teachers do. But he should also understand the psychological processes involved in the teaching and learning of mathematics, i.e., the nature of problem-solving. If he does not possess and apply such knowledge, his pupils may be able to parrot demonstrations or work the kind of examples they have been taught, but with such knowledge applied in his teaching they should be able to solve different kinds of mathematical problems through their ability to think mathematically.

The Natural Sciences. The same problems of providing *motivation*, of adapting to *individual differences* in native intellectual ability, and of developing quantitative thinking which trouble the mathematics teacher, confront the teacher of the physical and biological sciences, so it is not necessary to repeat them here. And similar efforts to alter the structure of the courses from the traditional formal organization to a more functional one related to the experiences and tasks of everyday life have been made. Such changes in objectives and hence in course

[13] Max Wertheimer, *Productive Thinking*, New York: Harper, 1945, pp. 16 ff.

content tend to improve the motivation of the brighter as well as of the retarded pupils. Secondary-school objectives of science instruction are beginning to place less emphasis on the knowledge one must have to be a biologist, a chemist, or a physicist, and more on the scientific knowledge that is of most worth for the citizen. The knowledge relates to consumer information, health, personal hygiene, medicines, first aid, sanitation, household appliances, agricultural pests, erosion, soil fertility, occupational diseases, safety measures, and, on the enjoyment side, the fauna and flora of the region. The public is fundamentally ignorant of matters of common scientific knowledge that would make for greater satisfaction and happiness. It squanders millions of dollars, for example, on useless, though usually harmless pills, lotions, tonics, and liniments which federal laws and better business bureaus cannot hope to fight without a base of public enlightenment. It is the responsibility of the schools to escape from the traditional rut and provide the knowledge that is needed.

Difficulties in reading science materials, often due to excessive vocabulary load, have been met by efforts to reduce the vocabulary from the hundreds of new terms formerly encountered in the textbooks to a reasonable number, and by improving understanding by providing experiences through trips, demonstrations, visual aids, and laboratory work. Too much emphasis has probably been placed on learning facts without understanding their significance, and perhaps even without any significance so far as the pupils are concerned, and not enough emphasis on the enjoyment of learning to find out what they want to know. The use of visual materials and even of laboratory methods may be as futile as the most arid verbal procedures.

In one experiment in very elementary biology, the problem was to find out whether a potato contains starch. The pupils were given some iodine to pour on some starch and also on a cross section of a potato, both of which turned purple forthwith. But the teacher enjoined them to be sure, if they were asked the question on the examination, to remember about the starch. The point was overlooked that other substances besides starch might have the same effect, and the instruction, though it should have encouraged problem-solving, emphasized verbal memory and nothing more.

The laboratory manuals at their worst are recipe books which lead pupils through the intricacies of so-called experiments in such a way that some of them do not know what it is all about, and which tempt them to "see" the things they are expected to see, or to copy them

from their brighter schoolmates or from their textbooks. At their best, they may furnish opportunities for the honest observation of the fascinating phenomena of nature, the building-up of an appreciation of the complexity of their interrelationships and the operation of their laws; and with this development of the scientific attitude, at least within the boundaries of a given field, a modicum of practice may be provided in solving problems inductively.

It has long been realized that the examinations in a subject not only reveal the mental processes called for, but even tend to direct the method of instruction in that subject. The kinds of questions for some time employed almost exclusively in the objective tests in science may be illustrated by the following examples. An exercise in word knowledge and generalizing, to the extent of distinguishing between proprium and accidens, is furnished in the "Logical Selection" Test.[14]

Directions: In each group of words below draw a line through *two words* in parentheses that tell what the thing *always* has:
  1. Elephant (slobbers, ears, whiskers, legs, feathers)
 17. Leaf (petiole, stipules, blastule, veins, pulvinus)

It is recognized that science instruction has for one of its main objectives the developing of the scientific attitude so that pupils may learn to handle causal and other logical relationships rationally. Some kinds of test questions are intended to measure these abilities. Causal relationships, for example, are sought directly in the more usual best-answer form.

  II. A frog lives in the mud at the bottom of a pond all winter so that—
    (1) It will not be seen.
    (2) It can reproduce.
    (3) It can keep warm.
    (4) It will not freeze.

In the multiple-choice questions it sometimes happens that the choices furnished do not exhaust the possibilities, and that some which are supplied are so manifestly ridiculous that the four choices are really only three or two. The same kind of symbolic manipulation is coupled with quantitative inference in the usual problems in the natural sciences.[15]

[14] This and the following example are taken from Cooprider's *Information Exercises in Biology*, Bloomington: Public School Publishing Company, 1924. Later test items follow these general procedures.

[15] The first of these samples is from the *Iowa Placement Examinations in Physics Training* and the second from the *Iowa Physics Aptitude Examination*, Extension Division, State University of Iowa, 1925.

1. If 100 c.c. of ice weighs 92 grams, what is its specific gravity? .....
2. What does it cost at 10 cents per kilowatt hour to run a fan 10 hours using 50 watts? .....

In some tests pure logical deduction is called for, in which the major premise is handed down ex cathedra and the problem consists in determining whether or not the given conclusion follows, i.e., is true or false:

1. *Given:* a piece of cloth was cut into a number of squares, and no cloth was left over.
   Conclusion: Therefore the piece of cloth was square ....
2. *Given:* All platinum is white, Mary's watch is platinum.
   Conclusion: Therefore Mary's watch is white ....
15. *Given:* x equals y; m equals $2y$.
   Conclusion: Therefore m equals one-half x ....

While it is undoubtedly true that some of these examples provide an opportunity for reasoning and should be retained along with straight factual questions, they do not test the pupil's ability to solve practical problems in the field studied. For one thing, the data provided are all needed, while in an actual situation much available information is irrelevant; and, furthermore, the conclusion to be drawn from a pupil's solution, as a rule, is that he *knows* something, not that he can *do* something. Other kinds of questions have been formulated to test the critical thinking of pupils in applying scientific principles in the solution of actual problems. In the case of the sample problem presented below preliminary studies had revealed that pupil explanations tended to fall into certain categories, which are given in parentheses.[16] Furthermore, it was found that pupil weaknesses would be revealed if those who were uncertain were given an opportunity to check the reason for their uncertainty. A list of such reasons also made it possible to include problems about which it was correct to be uncertain, particularly if insufficient data were provided. In this study the pupil was asked to state whether he agreed or disagreed with the underlined sentence, or if he was uncertain about it, and then to check his reasons.

Problem 1

A motorist driving a new car at night at the rate of 30 miles per hour saw a warning sign beside the road indicating a "through high-

[16] E. R. Smith and R. W. Tyler, *Appraising and Recording Student Progress.* New York: Harper, 1942, 95–101. Copyright 1942 by Harper and Bros.

way" intersection 200 feet ahead. He applied his brakes when he was opposite the sign and brought his car to a stop 65 feet beyond the sign. Suppose this motorist had been traveling at the rate of 60 miles per hour and had applied his brakes exactly as he did before. *He would have been unable to stop his car before reaching the "through highway" intersection.*

Reasons to be used if you are UNCERTAIN: [*The pupil indicates which.*]

1. I have never driven an automobile at 60 miles per hour and don't know how far an automobile will travel after the brakes are applied.
2. The distance required to bring a car to a stop depends upon the condition of the road surface.
3. The reaction time of the driver is an important factor in determining the distance a car will travel before it stops.
4. The mechanical efficiency of the brakes will affect the distances required for stopping a car.
5. Whether the brakes are of the mechanical or hydraulic type would make a difference in the stopping distance.
6. There are too many variable conditions in the situation to enable one to be sure about the stopping distance.
7. I do not know which mathematical formula to apply in this problem.
8. The distance required to bring a car to a stop depends upon the mass of the car as well as the speed.
9. Whether he stopped the car or not before entering the intersection would depend upon how good a driver he was.
10. The condition of the tires would be a factor to consider in determining the stopping distance for the automobile.

Reasons to be used if you AGREE *or* DISAGREE: [*The pupil indicates which.*]

11. The increasing difficulty of stopping objects at higher speeds is a part of nature's plan to keep people from driving too fast. (teleology)[17]
12. The distance required to bring a car to a stop is directly proportional to the speed of the car. (Wrong principle)
13. Many drivers have learned from experience that the distance required to bring a car to a stop is more than doubled when the speed is doubled. (Acceptable practice)
14. Just as the centrifugal force acting on a car going around a curve is increased four times when the speed is doubled, so will the distance required to stop a car be increased four times when the speed is doubled. (Unacceptable analogy)

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[17] The terms given here in parentheses, which serve to classify the reasons, are, of course, not included in the test forms.

15. When brakes are applied with constant pressure there is constant deceleration of the car. (Right principle)
16. Any student of physics ought to know that the distance required to stop a car when it is traveling at 60 miles per hour is more than 200 feet. (Ridicule)
17. It would require more than 200 feet for the second motorist to bring his car to a stop. (Assumed conclusion)
18. As the speed of a car increases, the mechanical efficiency of the brakes decreases considerably. (Wrong principle)
19. When the speed of a car is doubled, the distance required to bring it to rest is increased four times. (Right principle)
20. Automobile mechanics report that cars traveling at 60 miles per hour cannot be brought to a stop within 200 feet. (Unacceptable authority)
21. The distance moved while coming to rest by an object undergoing constant deceleration is proportional to the square of the velocity. (Right principle)
22. When the velocity of a car is doubled, the distance required to bring it to a stop may be quickly calculated by multiplying the velocity by four. (Wrong principle)
23. The kinetic energy of a car traveling at 60 miles per hour is four times that of the same car traveling 30 miles an hour. (Right principle)
24. Just as the penetrating distance of a bullet is increased four times when its velocity is doubled, so is the stopping distance of an automobile increased four times when its speed is doubled. (Acceptable analogy)

The extent to which science instruction can actually help to develop a scientific attitude in pupils is still open to question. Certainly this is one of the main objectives. Facts may be learned, and problems solved. But will the same evasions and escapes in the face of actual problems continue, the same prejudices remain, the same stereotyped thinking, the same confidence in authoritative pronouncements, the same readiness to be deceived by the emotional connotations of words, the same superstitious beliefs?

With respect to the latter it has been shown that children in the junior high school who had had one, two, three, four, five, and six semesters of general science respectively showed no reliable differences in the number of superstitions believed.[18] Of two plans of instruction employed on different groups—direct attack and training in scientific

[18] R. M. Zapf, "Superstitions of Junior High School Pupils, II. Effect of Instruction on Superstitious Beliefs," *Journal of Educational Research,* Vol. 31 (March, 1938), 481–496.

thinking—both reduced the number of accepted superstitions materially. It seems clear that merely "taking science" will not improve the operation of the thought process in children. Curricular material and methods must be modified and remodified with this objective definitely in view if any real gains are to be made.

The Social Sciences. The problems of improving instruction in the social studies are similar to those of other subjects: motivation; adapting to individual differences in abilities, aptitudes, and needs; and the selection and classification of concepts to be learned and understood. Social *studies*, the knowledge of human interrelationships, are sometimes confused with the social *sciences* as areas of investigation. These latter have been organized more loosely within themselves than the natural sciences, but unfortunately the barriers around each, whether it is viewed as a science or a "discipline," are no less solid. The following are the subject-matter areas usually classed as social sciences: history, political science, economics, and sociology, with psychology and geography holding a position in both groups. On the elementary and high-school level, curricular changes have been made in the direction of surmounting departmental barriers, moving away from the formal to a more functional approach, and introducing problems to take the place of purely factual questions.

Military campaigns, state capitals, duties of the legislative, executive, and judicial branches, and exports and imports, as such, are either neglected or studied in order that the knowledge so obtained may be used to solve problems. In addition, questions are being asked and answered by the pupils themselves with what help they may need coming from teachers and reference books: Is there any basis for the catch phrases, "Punic faith" or "perfidious Albion?" How does a congressman get elected? How might the conditions that give rise to wars be eliminated? How may help be most effectively provided to those who need it in the community? The questions can often take their start from local conditions: What can be done to make the town more attractive, to lessen the dangers of disease, to provide better drinking water, to reduce the unemployment, or to eliminate waste?

To the extent that standardized tests reveal the teaching objectives, it would have to be concluded that the associative learning of factual material is predominant, although the problem approach is sometimes found.[19] One test describes a number of different characters or incidents

[19] Van Wagenen, *American History Scales*. The first example is from Character Judgment Scale B, the second from Thought Scale B.

about them and then directs the students to draw a line under the three words which he thinks best describe them. In the case of the frontiers-men, the words are

shiftless careless enduring foolhardy cowardly timid dauntless lazy stout-hearted negligent

Another contains such hypothesis-provoking situations as the following:

12. After 1820 there was a large increase in the manufacturing indus-try in the United States.

In 1820 there were 5,000 pupils on the rolls of the public schools in Philadelphia; in 1821 there were only 3,000, in 1822 there were only 2,550, in 1823, there were less than 2,500.

(*a*) Where do you think the rest of the children would have been found?

(*b*) Why could not this same thing happen in our cities today?

19. The ninth and tenth amendments to the Constitution state clearly that Congress shall exercise only those powers given to it by the Con-stitution and that "all other powers are reserved to the states."

Some of the states ratified the Constitution only upon being assured that such a provision would be added to it.

Of what must the states have been afraid?

The problem of the selection of the content for social-studies instruc-tion is somewhat more complex than it is for the communication skills or for the natural sciences. The nature of the complexity may be clari-fied by considering three factors: tradition, partisanship, and ethno-centrism. So far as *tradition* is concerned, the familiar problem of formal vs. functional organization appears. History has been taught longer than the other social studies, it has a systematic time sequence as a basis of organization, and it includes the story of the development of all the sciences and arts. Although it has tended to emphasize the political crises of the past more than cultural achievements, its respectability and its inclusiveness give it a prestige position. Further support is found in the oft-repeated proposition that a knowledge of the past aids in the solution of the problems of the present. This well-nigh universally accepted objective of historical study is difficult to substantiate even on the advanced level, where historians are certainly no more likely to be consulted by people in difficulties than the sociologists, economists, political scientists, psychologists, lawyers, and educators, all operating within the social-science field. These latter differ from the historians

in that their techniques are aimed to solve problems in the present rather than to discover what happened in the past. The proposition is even more difficult to substantiate at the public school level of historical knowledge. A child must learn to adjust to his own contemporary world. It is the pattern of life around him that he must understand, not that of ancient Greece or medieval Europe, or even of nineteenth-century United States of America.

The traditional overemphasis of history has led to the neglect of social-science materials that contribute directly to the well-being of the individual and the community. More emphasis on geography, for example, might be expected to lead to modifications in agricultural practices—contour plowing, soil fertility, crop rotation and diversification, all of which have important economic implications, as would a realistic approach to the problems of the consumer in matters of food, clothing, and shelter. Psychology as a social science has opened up possibilities of better individual and social adjustment through the modification of group atmosphere and the use of counseling techniques. Political science and sociology may be related to problems of local government and group conflict, with the expectation that the generation now in school will be able as a consequence to deal with them more adequately.

Problems in this area lead to the second complexity factor in the selection of materials for the social studies, *partisanship*. In some of these areas the enlightened school program runs head on into social issues. Owing to deep-seated prejudices and the power of vested interests, schools may be ordered to mind their own business and put the pupils to work learning the names of the presidents and vice presidents! It would seem that the social-studies teacher, by virtue of his training, would be especially competent in dealing with such social phenomena, just as a chemistry teacher would not be expected to blow up his laboratory, though accidents sometimes happen. The strength of the American public school system lies in part in the obligation to develop an enlightened citizenry informed on the nature of political and social issues. But since the schools are supported by those on all sides of all controversies, the information must be impartially presented. The pupils learn not only what the a's do and what the b's do, but also what the a's say about the b's and what the b's say about the a's. To teach an idea is not to advocate it, but to teach about it, an important distinction for teachers and other citizens as well to make.

The third factor is *ethnocentrism*. Families, tribes, and states tend to exalt their own status in relation to those about them. In the schools, children learn the history of their own country, they learn about the

great deeds of its heroes, and perhaps about the dastardly tricks of its rivals. School textbooks are beginning to be examined for the passages they may contain that present the acts and motives of other nationals in a prejudiced and distorted fashion. Joint committees from the United States and Canada have studied their textbooks with a view to correcting such distortions, while Denmark and Sweden have by mutual consent examined each others textbooks in order to agree on the elimination of erroneous statements that have come down from earlier rivalries. Many other countries are being encouraged through the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to make similar corrections.

While greater familiarity might reasonably be expected with one's own region or land, without such checking a commendable patriotism may degenerate into a dangerous ultranationalism. This sort of thing might go on indefinitely, just as it has in the past, were it not for the fact that this is a different world now. The atomic physicists have put the finishing touches on what was started by the airplane and the radio. Their discovery is comparable in its significance for man only with the prehistoric discovery of how to make a fire. Albert Einstein has said that "a new type of thinking is essential if mankind is to survive and to move to higher levels."[20] He goes on to say,

In the light of new knowledge, a world authority and an eventual world state are not just *desirable* in the name of brotherhood, they are *necessary* for survival. In previous ages a nation's life and culture could be protected to some extent by the growth of armies in national competition. Today, we must abandon competition and secure cooperation. . . . Past thinking and methods did not prevent world wars. Future thinking *must* prevent wars.

The goal is to train people somehow to cooperate, to get on together. Earlier, it was a pleasant dream amidst the "realities" of tooth and claw. Now it becomes the only possible reality. In the area known as the social studies lie the great opportunities. The most determined efforts must be made to develop clear, rational thinking, uncontaminated by superstition, infantile prejudices, and stupid traditionalism. Questions must be argued, facts sought, decisions reached, modified in the light of further facts, and action carried forward on the cooperative basis in small events

[20] Albert Einstein, "Only Then Shall We Find Courage," reprinted from an interview in the *New York Times Magazine*. Princeton: The Emergency Committee of Atomic Scientists, 1947.

and in large. The human race has faced trials and tribulations, it has had its rendezvous with destiny, and some have learned what that means. But it has never before faced possible extinction.

Public enlightenment and the realization of the nature of the situation are essential. The foundations for an understanding of cooperation have been laid. They seem to be the same not only as a basis for training in the handling of larger questions, but also for the smaller problems that are important in the lives of people young and old. Whether the practice is carried on in social-studies classes, in homerooms, student council meetings, or in committees, experience in group thinking should undoubtedly be provided on a much larger scale than has been customary in the past.[21] Whether the problem is to plan an auditorium program, arrange a school party, put on a safety campaign, or investigate the local political or social-service organization, the plan of group thinking is the same. The steps in the procedure may be outlined as follows:

1. Stating the problem. Exactly what is it that needs to be known or done?
2. Collecting the data. What are the facts and conditions one needs to know about to make a decision?
3. Selecting and classifying the data. What information is more significant in its bearing on the problem?
4. Reaching a decision. What is the best thing to do under the circumstances?
5. Making a plan. What are the steps to be followed if the decision is to be put into effect?
6. Criticizing and revising the plan. What alternate plans or modifications seem desirable in the light of the information now available?
7. Putting the plan into operation. Instruct the persons concerned as to their duties and responsibilities, and arrange for reports of progress and of evaluation.
8. Revising the plan on the basis of trial. What changes need to be made in directions, personnel, and operation as a consequence of the try-out to insure that the objectives sought are obtained and the problem actually met and solved?

6. Realizing Values in Symbolic Learning

Usable Knowledge—Application. At the close of this discussion of symbolic learning, the chief load of the traditional school subjects, an

[21] See H. S. Elliott, *The Process of Group Thinking*, New York: Association Press, 1928.

examination of its values is appropriate. Pupils learn to spell that they may write, they learn to speak that they may express themselves, they learn to read that they may know and understand, and they learn to compute that they may deal with the problems of number and space with which they will be confronted. Thus far the learning is instrumental. The fundamental processes are useful only as they contribute to the ends for which they are the means. There is no such thing as spelling for spelling's sake.

What will the pupils write, what will they say, what will they read, and what solutions will they find to their problems? The answers to these questions determine not only the nature of the subject matter of the secondary-school subjects, but that of the materials of learning in the fundamental processes as well. The means are embedded in the ends. If curriculum makers, whoever they may be, firmly grasp this point, the direction of needed change in curriculum and method becomes apparent. And many such changes are already under way. In spelling, for example, children are taught to spell the words they want to write. In speech and language they are taught to express their ideas in their own groups. In reading lessons they are taught to read newspapers or perhaps arithmetic problems, and in arithmetic they are taught to compute costs.

The functional approach carries on to the secondary-school level, where the natural and social science fields are surveyed, not to make scientists, though that is an important later objective for some, but to help the learner to understand his world, to restructure his experience in terms of the knowledge that has been conserved and made available to him. He must know in order that he may comprehend, and he must comprehend in order that he may participate competently and with satisfaction to himself and those about him.

Observation and Examination. The understanding of the symbolism of words and numbers calls for careful observation and examination of the symbols and of the referents, the objects and relationships for which they stand. Such observation and examination do not build up general powers of observation, but they do help the pupil to form habits of examining the kind of data he has had experience in examining. He can become accustomed (conditioned) to respond by piecemeal examination to scientific or social facts or situations and not be misled by sensationally prepotent stimuli, to look for the significant factors, to inquire into true and false meanings. He can have varied experiences with the same object or phenomenon in different contexts, whether it is a right angle, a saline

solution, a substantive, a compromise, or a feeling of insecurity. But he must know more than the words, the symbols. He must be able to recognize the specimens and, when he meets them, not only know what to do but have the experience of doing it.

Respect for Facts. Symbolic learning provides endless opportunities for developing in pupils a respect for facts. Hearsay evidence, old wives' tales, superstitions, faulty deductions, emotionalized appeals, specious arguments, and semantic errors—all these and other forms of self-deception should be recognized for what they are. Pupils should have experience with them in their varied forms and have practice in the discovery of error. A corresponding insistence on facts, an interest in the data, and a demand for accuracy should and can be inculcated through the medium of language, which is at the same time such a facile instrument for error. The penchant of human beings not only for deceiving others but also themselves needs to be opposed at every turn. The truth is the supreme objective of the scholar and the scientist. It is no less the objective of those who are just learning.

Critical Attitude. A respect for facts brings with it a critical questioning attitude. A certain degree of skepticism is needed if the goal of truth is to be approached. Skepticism can, of course, be carried to an extreme, as is likely to be the case with those who have been deceived, particularly if they have previously had a beautiful childlike faith in someone or something. The idol is discovered to have feet of clay. Such a reaction is natural, but it is unnecessary if one is not "taken in" in the first place. If a child is taught that the national heroes were gods without a stain and learns later they were but men, he is likely to become cynical and take refuge in iconoclasm. If he learns the facts in the first place, he is more likely to recognize the importance of their achievements and the relative unimportance of their weaknesses. The fact that someone in the public eye is "human after all" is of greater interest to the readers of the tabloid press than it would be if the schools were doing their duty. It is the distinctive achievements of men that raise them above mediocrity though the events of lesser importance in their lives may supply a background that helps to explain their successes and failures.

A critical attitude can be developed if children's pronouncements are questioned and if they are expected to raise questions themselves. How do you know? What is the evidence? Who reported it? What did he want to obtain? Does it follow? Such questions as these, repeated again and again, and not always to be answered by quoting "the book," may

be expected to reduce the gullibility of the people somewhat and pro-
mote a more rational approach to the problems, both small and large,
that confront the citizen on every hand.

Rational vs. Frustration Responses. Insults, grudges, and spite fences,
to say nothing of nervous breakdowns and crimes of violence, consti-
tute some of the more objective evidence that people too often meet
their problems by frustration behavior instead of by employing a more
rational approach. The schools of the past were not much concerned
about matters that lay outside of the realm of verbal knowledge. Dis-
ciplinary situations were an intrusion, though often provoked by an
overemphasis on useless knowledge. Pupils even now are too often
thrown into the river of facts, and, if they can strike out and keep their
heads above water, all well and good. If they can't, that is just too bad;
let them struggle and sink; the school is not set up to handle such cases!
On the other hand, the efforts to reduce vocabulary load, to adapt to
the maturation level, to provide remedial or correctional instruction,
and to adapt to individual interests, aptitudes, and needs—all these point
in the other direction. The use of the functional approach and the selec-
tion of tasks graded in difficulty, in which there is some chance for suc-
cess, provide the opportunity for practice in the solution of problems on
a rational basis. Once a certain degree of competence is attained, it is to
be hoped that the procedure will be continued.

Love of Learning. The emphasis on the instrumental and practical
values of the school subjects should not obscure their importance as a
medium of enjoyment. At an early age children want to know. They
ask questions, endless questions. It is fun to find out things. The world
about them as they grow older is teeming with mysteries which they are
eager to explore. Too often, somewhere along the line, this natural
curiosity, this eagerness to know, becomes dampened and all but dis-
appears. Is it the school with its imposed tasks and often dreary routine
that is responsible? For many, particularly those in the higher intelligence
levels, the joy of finding out continues. They may become scholars or
scientists devoting their lives to learning and to finding new truths. For
the others it should still be fun to learn. This does not mean sugar-coating,
watering-down, eliminating effort. As a matter of fact, easy tasks as a
rule are not much fun. Children and young people willingly undergo real
drudgery in sports and in training for athletic contests. There is as much
or more fun to be found in words and numbers. With all our seriousness
of intent, and all our concern with the problems that confront us, we
should not forget that the schools have as one of their main objectives

the development of desirable attitudes, among which there is none more desirable than a love of learning.

In Summary

The psychological processes and principles elaborated in the preceding chapters are all involved in the important task of acquiring facility in the use of the conventional language symbols. They have a bearing, too, both on the choice of teaching methods and on the formation of curricular objectives.

Motivation is improved when the fundamental processes are viewed not as ends in themselves but as means for the attainment of knowledge and understanding. The language arts, or communication skills as they are sometimes called, are in reality not separate subjects; instead, they constitute a fundamental unity. For their development, basic experience is necessary in order to give meaning to the symbols, and the symbols are necessary to assist in structuring experience.

The adaptation of instruction to individual differences is particularly important in symbolic learning in order to avoid the frustrations that may make that instruction futile. Readiness to undertake a course of study, the rate at which it can be pursued, and the techniques of remediation when the adaptation to ability levels has not been sufficiently close, are all important psychological considerations, and all may be dealt with more satisfactorily if objective measuring devices are employed.

It is of prime importance to sense, to discriminate, and to perceive correctly the various unit symbols, whether they are heard or read, spoken or written. This applies specifically to spelling and writing and is of particular importance in the study of a foreign language. However, the letter and number perceptions should not be emphasized to the neglect of the larger units of words and sentences and their various patterns of meaning.

The associative processes, too, are fundamental both in the improvement of the mother tongue and in foreign-language instruction. The vocabulary burden may be lightened in various ways, but, as in the experiments, learning in context is more efficient than the rote learning of discrete items. The best context is to be found in the previous experiences to which the symbols may be attached.

All the processes discussed are involved in instruction in mathematics and in the natural and social sciences, but in them reasoning is particularly emphasized. While the formal organization of subject matter in these fields contributes to their teachability, at least in the matter of memorizing facts, it is of dubious worth when it directs the course of

instruction away from the attack on problems of concern to the students, their families, and their communities.

Whatever the course content, symbolic learning should and can teach respect for facts, develop a critical attitude, encourage rational rather than frustration behavior, and enkindle a real love of learning.

Questions

1. What is meant by the statement that the fundamental processes are instrumental?
2. How can instruction produce frustration behavior? What are some of the signs that a pupil is being assigned tasks which are too difficult for one of his level of development?
3. How can one tell when a pupil is "ready" to take up any particular subject?
4. Discuss: If pupils were properly taught in the first place, there would be no need for remedial instruction.
5. What are the arguments for and against the teaching of formal grammar?
6. Show the value of experience with objects, and their interrelationships in facilitating the learning of one of the subjects discussed in this chapter. How can the experience be obtained?
7. Distinguish formal and functional instruction and show some of the advantages of each.
8. How can instruction in the natural or social sciences promote critical thinking? Good citizenship?
9. What can be done to develop in pupils a love of learning?

Readings

American Educational Research Association and the Department of Classroom Teachers. *The Implications of Research for the Classroom Teacher. Joint Yearbook.* Washington: National Education Association, 1937.
   Chapters VIII–XI report the results of researches, many psychological in nature, in usable form.
Anderson, H. R. (Ed.) "Teaching Critical Thinking in the Social Studies." *Thirteenth Yearbook of the National Council for the Social Studies,* 1942.
   A brief statement of possibilities.
Chase, S. *The Tyranny of Words.* New York: Harcourt, Brace, 1938.
   A popularly written treatment of semantics.
Garrison, S. C., and K. C. Garrison. *Fundamentals of Psychology in Secondary Education.* New York: Prentice-Hall, 1936.
   See the chapter on the school subject in which you are most interested.

Gates, Arthur I. *Improvement in Reading.* New York: Macmillan, 1949.

Harris, A. S. *How to Increase Reading Ability.* New York: Longmans, Green, 1947.

Hogben, L. *Science for the Citizen.* New York: Knopf, 1938.
An interesting source for science teachers and others.

Huxley, Julian. *Unesco, Its Purpose and Its Philosophy.* Washington: Public Affairs Press, 1947.
A brief statement of what might be, under the guidance of the United Nations Educational, Scientific, and Cultural Organization, by its first Director General.

Judd, C. H. *Educational Psychology.* Boston: Houghton Mifflin, 1939.
Good chapters on the mental processes employed in symbolic learning.

McKee, Paul. *The Teaching of Reading.* Boston: Houghton Mifflin, 1948.

National Society for the Study of Education. *The Measurement of Understanding.* (*Forty-fifth Yearbook*, Part I.) Chicago: University of Chicago Press, 1946.
Supplementing instruments for testing skills and factual information are suggestions for "methods of appraising the student's readiness to react intelligently to recognized needs." Different symbolic subject matter areas are treated in Chapters V–IX.

National Society for the Study of Education. *Science Education in American Schools.* (*Forty-sixth Yearbook*, Part I.) Chicago: University Press, 1947.
Psychological considerations are implicit in the presentations of aims, curriculum, and method. See especially Chapters II and III.

National Society for the Study of Education. *Reading in the High School and College.* (*Forty-seventh Yearbook*, Part II.), and *Reading in the Elementary School.* (*Forty-eighth Yearbook*, Part II.) Chicago: University of Chicago Press, 1948, 1949.
These companion volumes are very valuable not only for their content, but also for the references they contain. Select chapters related to special interests.

Progressive Education Association. *Mathematics in General Education.* New York: Appleton-Century, 1940.
Newer trends are elaborated.

Progressive Education Association. *Science in General Education.* New York: Appleton-Century, 1938.
The functional approach is emphasized.

Reed, H. B. *Psychology and Teaching of Secondary School Subjects.* New York: Prentice-Hall, 1939.
Note particularly the chapter dealing with your special subject matter interest.

Slavson, S. R., and R. K. Speer. *Science in the New Education.* New York: Prentice-Hall, 1934.

The new approach in science education.

Skinner, C. E. (Ed.) *Readings in Educational Psychology.* New York: Farrar and Rinehart, 1937.

Chapter XIV, "Psychology of Elementary School Subjects," and Chapter XV, "Psychology of Secondary School Subjects," include a number of enlightening excerpts.

Starch, D., H. M. Stanton, and W. Koerth. *Psychology in Secondary Education.* New York: Appleton, 1941.

In Part II, Chapters 10–12 and 14–16 discuss the subjects in which symbolic learning predominates. Recent research studies are cited and extensive reference lists follow each chapter.

Woodworth, R. S. *Experimental Psychology.* New York: Holt, 1938, Chapter XXVIII.

Perceptual-Motor Learning-Skill

The Performance Objective. Not only is it desirable for pupils to obtain knowledge and understanding, they will also need to acquire various skills. There are many things they want to be able to do, but these require time and practice, and, if learning is to be effective, they also require adequate instruction.

True, a great deal of coordinated muscular movement which the organism is able to perform has never been learned. *Organic behavior* has been going on for some time even before birth, including respiration, circulation, digestion, and the like. These are physiological processes, primarily involving the smooth muscles, which operate with little or no interruption in the living animal. Also, some *reflexes* or patterns of behavior, the movements being chiefly of the striped or skeletal musculature, appear so early in the development of the individual that they may be considered innate. But many coordinations that are useful or necessary are not in these two categories of organic and reflex behavior. They must be acquired. The process of acquiring coordinations that operate when the appropriate stimulus is present will be discussed in this chapter.

With the exception of oral reading, handwriting, and an earlier enthusiasm for "declamations," most coordinative learning came late into the school program. Even foreign-language study has emphasized translation more than speaking; sports, later regenerated as physical education, came in by the back door of extracurricular activities, as did music and the other arts, and are only recently beginning to be admitted to a regular place on the time schedule, while shopwork and commercial subjects have too often been thought of as appropriate occupations to keep the less intelligent out of mischief or as vocational or trade training only.

Fortunately, the tide is moving in the opposite direction. The bodies of the children are being welcomed into the school along with their minds, and the values to be found in doing, as well as in knowing, are gradually coming to be recognized.

1. Pupil Need for Coordinative Learning

Activity. What are some of the values to be found in skillful action? Perhaps the most important is that it satisfies the basic need for activity. Children and young people have an enormous amount of energy. In an earlier period, and in many localities today, much of this energy was employed in useful work—doing chores and helping in the kitchen, in the garden, in the barn, and in the fields. But now, many homes have shrunk in size and there is no workroom but a kitchenette, and no legitimate way for children to let off steam. The confining discipline of the traditional school may not have been too ill suited to pupils who had plenty of "activities" at home. But their explosion into the out-of-doors at recess period or at the close of the day's session indicated a natural reaction to repression. Freer movement within the school building, and things to do (to alternate with sitting and listening), including an adequate play and sport program, have done much to satisfy the basic need for activity. When these things are coupled with an adequate program for the improvement of health and physical fitness, the school begins to fulfill its responsibility in this area.

Mastery. A second group of satisfactions is to be found in the need for mastery. If his skill is fully developed, an individual is more efficient in what he is expected to do, whether it is to read, or type, to speak, play a musical instrument, take part in sports, or reduce the probability of injury or breakage with machines or apparatus. Highly developed skill likewise brings the thrill of satisfaction in competition and prestige in one's peer group. However it is unnecessary for everyone to be a star, for a modicum of skill in sports and other activities in which a child participates often affords compensatory satisfactions for lack of success in other ways, perhaps in the academic subjects.

Cooperation. What may be distinguished as the social in contrast with the more individualistic needs likewise find satisfaction in the processes of motor learning. To be a member of a team gives a feeling of security, of belonging, and provides opportunities for cooperation toward common objectives often when one's own personal glory is sacrificed that the team may win. But team sports are not the only means to this end. In any organization such as a glee club or dramatic club, a band or

orchestra, the same opportunities are provided, and each makes his own contribution, subordinating it to the demands of the production as a whole.

A case could be made for cooperative endeavor as the chief advantage to be gained from the development of many skills. The academic subjects are intensely individualistic, each person for himself, and in some schools punishments are meted out to any cooperators, particularly in the final competition (examination). In most sports, however, players are taught to "support" team members in various ways, and even in dramatic and musical performances to catch up a line that is forgotten, or to cue in a musical passage that is a little weak. Such experiences as these are valuable, and are not only appreciated by the persons who need the help, but are satisfying to those who assist.

Vocation and Avocation. Some skills serve as a means of livelihood, when they are sufficiently highly developed. Professional musicians, actors, and athletes, including music teachers and coaches, depend on their skills as a means of satisfying the primary needs of food, clothing, and shelter. The same is true of the masters of those skills that do not assemble a crowd—typists, stenographers, telegraphers, mechanics, skilled tradesmen, and others. Many shop courses are introduced with a view to providing for apprenticeship training. For the more complex skills, however, even pre-eminence in school may not be an indicator of a wise choice for a career. The competition outside is severe. On the other hand, those who do achieve vocational success have been in school where their talents have often been recognized and nurtured.

An individual may have sufficient ability along some lines to make his living at it if he wished to give the time necessary to develop it, but he may prefer to earn his living in some other way. Or he might feel that he would never be good enough to satisfy himself professionally, but he gets a lot of fun out of doing it, whatever it may be. The avocational objective, satisfying the need for enjoyment, is one which should always be considered in helping children plan their school programs.

From this point of view, the team games do not stand up well in the long run, since only rarely are there opportunities to play them after school is over, and in a few years the requisite physical stamina is gone. In contrast, golf, tennis, badminton, bowling, and sailing may be continued for many years. The music and dramatic skills likewise often find no opportunity for practice after school days are over, though in many places community orchestras and ensembles and amateur dramatic clubs are being developed, which give those who begin these activities

in school a chance to continue. And the shop, which in many schools is strictly vocational or prevocational in design, in some places takes on an avocational aim as well. It can and should be as much a part of a general education as the laboratory or the library. In it, many pupils may develop interests in skills that will furnish enjoyment for their leisure hours for years to come. For example, a college president is a cabinet maker in his spare time, and a certified public accountant polishes and sets semi-precious stones. Illustrations could be multiplied.

When people come to accept the idea of the community school, an institution designed to serve the community as a whole, not just its children and youth, the school shop, library, music room, studio, assembly room, gymnasium, and playground will be important centers of activity afternoon and evening for people of all ages to gather to enjoy the satisfaction that comes from developing skills and from creative activity.[1]

2. ADAPTING TO INDIVIDUAL DIFFERENCES

Level of Development. The humorous magazines occasionally play up the hopeful father who brings home baseball gloves and other athletic equipment for his infant son. Parents are quite apt to overestimate the abilities of their children and expect more of them than is warranted by their age and stage of development. Teachers are less likely to do this since they are used to dealing with large numbers of children of approximately the same age and hence are able to form rather clear ideas of what may be expected of a five-year-old, or a twelve-year-old. However, the question of readiness for the development of motor skills is hardly less important than that of readiness for reading or arithmetic, and much less is known about it. When, for example, should children begin instruction in handwriting, typing, the use of tools, speaking French, or playing the violin?

The basic principles of maturation based on experimental evidence here serve as a guide. The first is the principle of *individuation*. The infant's movements at first are generalized, all-over movements of arms and legs, no matter what the stimulus. Only gradually does the more specialized movement become individuated out of the larger mass activity enabling him to grasp a ring, pick up a pellet, or pile one block on another.[2] Since the finer adjustments thus emerge gradually from the

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[1] It is recognized that school budgets are scrutinized by taxpayers whose idea of a school is the kind which they themselves attended. However, until such ideas are gradually changed, churches, playground departments, labor unions, fraternal organizations, and other groups in many places are beginning to recognize the need and to provide the necessary financial support for one enterprise or another.

[2] Arnold Gesell, *The Embryology of Behavior*, New York: Harper, 1945.

larger movements, it is inferred that training in more delicate manipulative skills such as sewing, handwriting, and the like should be delayed until the larger, bodily activities have been sufficiently exercised and the growth processes have prepared the child for greater precision of movement.

The second principle is that of *incidental experience*. Children's motor control matures very rapidly, given the opportunity for normal activity. They run and climb about, manipulate in various ways everything that comes to hand, and acquire many coordinations without any formal instruction whatever. What happens when they are taught systematically? Do they learn any more rapidly? Apparently they do not if instruction is in the normal, postural, and locomotor skills required in walking.[3] If the playground is equipped with scooters and tricycles, that is about all that is necessary for the children to learn how to use them. In more unusual skills, such as buttoning and the use of scissors, twelve weeks of training resulted in a real superiority of two-year-olds over other children of the same age who had not been so trained.[4] But during the next week, training given to the latter group brought them up practically to the level of performance of those who had been trained for twelve weeks.

This experiment illustrates what may be called the principle of *economy in later training*. The process of maturing in a normal environment makes it possible to spend much less time on training. Other experiments, employing the method of co-twin control, show the same results.[5] Six weeks of special "instruction" in manipulating cubes and climbing stairs for one two-year-old gave her practically no superiority over her twin sister who was not similarly encouraged or "guided." However, the principle of economy in later learning cannot be pushed too far. In some skills which have not been fully explored, in music and in foreign-language pronunciation, for example, those who begin early have a distinct advantage over those who begin later and who may never be able to catch up with them.

This may be due in part to special talent, to continued practice, or to a fourth principle, that of *interference* or negative transfer. The learner, through his incidental experiences, may pick up wrong methods which

[3] M. M. Shirley, *The First Two Years: A Study of Twenty-five Babies. I. Postural and Locomotor Development*, Minneapolis: University of Minnesota Press, 1931.

[4] J. R. Hilgard, "Learning and Maturation in Preschool Children," *Journal of Genetic Psychology*, vol. 41 (September, 1932), 36–56.

[5] M. B. McGraw, *Growth: A Study of Johnny and Jimmy*. New York: Appleton, 1935. Also Arnold Gesell and Helen Thompson, *Learning and Growth in Identical Infant Twins*, Genetic Psychology Monographs, vol. 6, No. 1, 1929.

earlier instruction might have avoided and which are modified only after considerable difficulty or not at all.

The upshot seems to be about the same as it is in the case of reading. Children are ready for instruction in a given skill when they are sufficiently mature physiologically, when they can already perform some of the elementary skills required for it, when they have observed children of their age or older engaged in it, and when they give evidence of an interest in participating themselves. It is here assumed, of course, that expected performance would likewise be based on their stage of development—that baseball for sixth-graders would be quite different from that for twelfth-graders, for example.

The weakness of most school programs lies in their meager offerings. Incidental experience is lacking in many musical, vocational, and play skills. The children may not know they exist. A rich program of activities, on the other hand, encourages sometimes quite unexpected readiness in the younger children as they grow old enough to participate in what is going on.

Body Type. In the near future much more attention will probably be given to body type (Chapter V) than has been the case in the past. As a rule, children have been required to follow a rather narrow program of physical activity and sport, with accolades for the athletic mesomorphs and little but ridicule for the slow-going endomorphs and slender ectomorphs, who are rarely made to feel at home in a gym suit or a football or baseball uniform.[6] The current attitude resembles that of a century or two ago toward the slow learner, who was given a dunce's cap to develop his interest in the things of the mind. It is probable that the endomorphs can never be browbeaten into putting forth any great degree of physical effort, though, if they are strong enough, they might be interested in working with the shot, hammer, discus, or javelin. The ectomorphs are not improved by the inexperienced coach's funny remarks. Temperamentally, the body contact of football and wrestling, for example, seems to be abhorrent to them. But tennis, squash, badminton, and golf provide the physical exercise and the social companionship they need.

Interest and Ability. The performance objective is usually so clear-cut, and the activity involved is for many such a pleasant contrast to the ordinary school routine, that motivation in the acquisition of skills is gen-

[6] W. H. Sheldon, S. S. Stevens, and W. B. Tucker, *The Varieties of Human Physique*, New York: Harper, 1940.

erally high. When such learning is not well motivated, as, for example, in piano practice, inquiry should probably be made into the maturity of the pupils in relation to the level of excellence demanded, the competence of the instruction including the incentives to practice, and the kinds of pressures employed, or into the possibility of enlarging the list of offerings. However, the problem of selection still remains if learning is to be effective and satisfying. Some fortunate few have no doubts about what they want to do. They may always be found in their spare hours in the shop, in the music room, or on the playground. For others, some kind of systematic shifting around from one activity to another may be tried, to give them the experience they need to make a choice.

While interest does not necessarily carry with it the ability required to progress far in a given skill, it is a good base from which to start. For most skills there is satisfaction to be found at various levels. For avocational and vocational choices as well, certain other factors, however, may well be taken into consideration, including native intelligence, special talent, and social demand or opportunity for the practice of the skill.

In general, the teacher who has the reponsibility for instruction in any of the motor skills needs to realize that abilities differ here, as they do in other school subjects, that the variations do not correlate closely with intelligence, that some pupils can improve more rapidly than others, and that, if conditions are right and instruction is what it should be, all can probably improve more than they usually do.

Individual Differences and Work Methods. Differences between individuals in the ability to perform motor skills can be due to three sets of factors: (1) the anatomical structure—sense organs, nerves, and muscles, (2) the amount of previous training and opportunities for learning, and (3) the work methods or patterns of behavior adopted by each individual. Affective factors such as attitudes and autistic adjustment mechanisms (Chapter VI) are also often important.

The differences in ability, however, are not very consistent.[7] Although changing the stimulus from one sensory field to another, or from one musculature to another (e.g., right to left hand), makes little difference in the rank order of a number of subjects, changing the task makes a great deal of difference. Indeed, there is so little correlation between motor abilities, whether they involve gross or fine movements, that it

[7] R. H. Seashore, "Physiological Psychology," *Annual Review of Physiology,* vol. 8 (1946), 513–534.

would seem there is no such thing as general motor ability.[8] The highly trained in athletics and in piano, in some of the test situations, ranged on various tests from near the top to well below average, the intercorrelations among the test scores ranging from $-.15$ to $+.63$. Until more satisfactory categories are found, the independence of motor skills renders impossible the determination of aptitude by means of selected test samples.

The most significant factor in the differences between individuals in motor skills, granted a normally functioning physiological organism and sufficient general intelligence, is the work methods they employ while learning or being taught or coached.[9] This applies both to the preliminary adoption of a way of going to work at the skill in the first place and to the refinements practiced as the learner progresses. The refinements would include (1) the elimination of unnecessary movements, (2) the substitution of other, correct movements, (3) the overlapping of part movements that might proceed simultaneously in a new coordination instead of successively one at a time, and (4) responding to the right parts of the changing stimulus situation at the right time.

Such refinements or modifications spell the difference between an awkward and a skilled performance, between a poor worker or a dub and an expert or a champion. Sometimes a learner can figure them out for himself, or get suggestions from a book, and so improve his ability. Most people, however, need to be shown the better ways. They need instruction, so that they may practice correctly and develop good rather than poor work methods, or in order that the necessary corrections in their work methods may be made.

3. Effective Practice

Progressive Approximation. Improvement in perceptual-motor learning takes place by progressive approximation of the correct or perfect performance. While it used to be spoken of as "trial-and-error learning," the term progressive approximation is a more accurate description. Practice is essential. But practice is not repetition, or there would be no change—no improvement. Instead, later trials (or errors) are more nearly correct than earlier ones. The pattern of response or "form" is better or the act is performed more rapidly, or the outcome or product is more exact or more nearly what is desired.

[8] H. G. Seashore, "Some Relationships of Fine and Gross Motor Abilities," *Research Quarterly*, 1942, 259–274. Also, R. H. Seashore, "Individual Differences in Motor Skills," *Journal of General Psychology*, vol. 3 (January, 1930), 38–65.

[9] R. H. Seashore, "Work Methods: A Neglected Factor Underlying Individual Differences," *Psychological Review*, vol. 46 (March, 1939), 123–141.

What is repeated is the general space-time pattern, with variations. Certain of the variations successively become figures on the ground of the total space-time pattern. The learner attends to these variations. He may note that the ball was thrown too high, that the club was too tightly held, or that the note was a little flat. So he repeats the action except for the "mistake"; this part he changes a little, noting whether or not the change makes the total act a little more like the pattern he is trying to construct. A series of such modified repetitions constitutes effective practice.

If children are just turned loose to practice, and have no one to show them what they are doing wrong, practice is not effective. They may not progress at all, or they may develop motor coordinations which are partially satisfactory but will keep them from progressing as they otherwise might. Certain concomitant factors which make for effective practice can advantageously be considered in detail. These are incentives for practice, strength and fatigue, progress as plotted on a learning curve, and fluctuations, plateaus, and limits of improvement.

Incentives for Practice. A learner may be motivated to start acquiring a skill, one adapted to his stage of development, body type, interest, and ability, one selected from a wide range of choices, and one which he recognizes as a means of satisfying a present or future need. His internal or intrinsic satisfaction is the best incentive, and it may be all that he needs—the joy found in doing what he likes to do. Still he may rebel at the long periods of practice required, or fail to put forth his best effort as time goes on. Competing interests draw him away from the piano bench or the shop or typewriter. What kind of external or extrinsic incentives may be employed to keep him interested in continuing the necessary practice?

One such means employs the drive generated by the habit mechanism—a *time and place habit*. If a regular portion of the day is set aside for practice in a particular place, it will often be easier to practice than to do anything else. And pleasant reminders of the "appointment" are more helpful than such adjurations as "why don't you ever practice!" Of course, in team sports and certain other activities, such a scheduling is an accepted part of the program.

A second incentive lies in what may be called *social approbation*. The teacher or coach, the parents, one's friends expect that one will go ahead with what has been started. In particular, the learner may fear the coach's or teacher's displeasure, or better, he may want to work for his approbation. In the case of other skills that result in a product,

the place of social approbation is likewise important. The child takes home the picture he has painted, or the gadget he has made in the shop. He fixes the automobile so that it works, or he speaks in Spanish to the Mexican, who understood what he said!

A third incentive lies in the *social demand* of the peer group. If a player shows lack of skill he should have developed, the team suffers. If the music has not been practiced, the recital or concert goes off badly, as does the dramatic performance if the actors have not practiced their parts. The public performance is quite different from the examination. While the latter is an individual exploration, and one person's failure does not affect the others, the public performance depends upon the skill shown by each one who participates. To get ready for it is an ultimate enough objective to produce energetic practice in most all the participants.

And, lastly, the *chart of progress* is an admirable incentive, one which the skills can employ much more satisfactorily than the content subjects. Practice is sure to bring improvement, whether it is distance jumped, time taken to run a certain distance, number of lines typed correctly per unit of time, or whatever it may be. An actual chart showing improvement will often compensate a slow-learning pupil for performance below the average of his group, and encourage him to continue.

Strength and Fatigue. Owing perhaps to the complexity of the useful and enjoyable motor skills, relatively little work of a scientific nature has been done with them directly to reveal the process of their acquisition or the best methods of instruction, though promising experiments have been performed. In order to bring the coordinations down to the point where single variables can be separately studied, basic elements such as strength, fatigue, and simpler movements, have been subjected to laboratory investigation, from which, however, certain generalizations can be made that apply to the more complex skills.

With the beginning of the twentieth century, the *hand dynamometer* for measuring strength of grip was supplemented by various kinds of recording apparatus—the *kymograph*, or revolving drum upon which paper was wound, and the *tambour* with stylus or pen to produce tracings upon it by pneumatic and later by electrical transmission. The *ergograph* used this recording device connected with a weight, to be pulled up at regular intervals of about a second by the finger, to which it is attached by a string over a pulley, to test endurance or fatigue.

Fatigue is usually defined as a rapid decline in the extent and strength of muscular contraction followed by complete loss of power to contract

as a result of continuous or prolonged exercise. The typical muscular fatigue curve is shown in Figure 71. The inability of the muscle to contract has been ascribed to the accumulation of waste products in the muscle at a more rapid rate than they can be carried off by the blood-stream, to the catabolic or wearing-down processes in the muscle itself, to chemical change at the point of contact of muscle and nerve and in the nerve cells, and to other conditions. Muscular development comes with exercise and maturity, but overexercise produces exhaustion, which in children may lead to permanent harm. Especially is overexertion dangerous during the menstrual period or after illness, particularly when the illness is due to some infection, as in the case of scarlet fever, influenza, or rheumatic fever, or when there is already a disability of the heart or some other organ.

Figure 71. *Typical Muscular Fatigue Curve* The vertical lines indicate the relative distances through which a weight of 6½ pounds is pulled by the middle finger of the right hand. Contractions were made at intervals of two seconds. (W. H. Howell, *A Textbook of Physiology for Medical Students and Physicians*, Philadelphia: W. B. Saunders, 10th edition, 1927, p. 49.)

But muscular fatigue is an elusive quality. When a muscle has been reduced seemingly to complete inability to contract, it will continue contraction if stimulated by an electric current. Emotion sometimes produces the same effect. When an individual is utterly exhausted so that he can apparently not move another step, a sufficiently frightening occurrence may make him continue, sometimes at well-nigh full speed. Another factor, recognized particularly in long-distance running and in exacting sports like basketball, is the so-called second wind. Untrained participants quickly reach a maximum after which their performance tapers off, while trained athletes in good physical condition reach another high peak before fatigue sets in.

Bodily fatigue, as it might result from continued running and jumping, supposedly reduces the speed and precision of finer adjustments such as marble-sorting. However, under experimental conditions of extreme fatigue, with sufficient motivation, subjects have achieved a speed in marble-sorting as high or higher than when they were completely rested.

Nevertheless, evidence of fatigue in coordinated movements may be shown not only in reduced speed, but also in loss of smoothness of movement, regularity, and precision.

Apparently the body builds up a protective resistance to tissue injury through fatigue which may be in part overcome by sufficient persistence and determination.[10] An outer line of defense against injury is found in what is variously called mental fatigue, ennui, or boredom. An individual just does not want to continue a monotonous task and tends to slow down, particularly if it does not result in the attainment of any goal that he can understand or appreciate. Or his boredom may increase while efficiency continues constant or even improves. He may persist, but if he should suddenly discover that his task advances him in a direction in which he wants to go, a sudden change may be easily observed in his behavior. The "mental fatigue" disappears quite rapidly.

In spite of the elusiveness of genuine fatigue—six-hour reading periods, with high-school and college students as subjects failed to reveal any[11]—its preliminary symptoms are readily discernible, and tend to retard learning. The same means are therefore employed in practice that are already familiar in drill—namely, the introduction of rest-intervals or changes of activity. Experienced coaches, music and shop teachers, and others are well aware of this and strive to shift tasks and provide opportunities for relaxation when signs of fatigue begin to appear.

The Learning Curve. A number of simple coordinations have been studied in the psychological laboratory. The plan has been to give the subjects uniform periods of practice and chart their improvement in either time or work units. If the practice periods are marked off from left to right on a horizontal line, and time units upwards on a vertical line from the point of intersection, the score for each performance can be represented by a point between the two lines. A line connecting a number of such points (time curve) descending from left to right would indicate improvement. If units of work per unit of time (e.g., strokes per minute) are marked off on the vertical line, improvement is shown by an ascending line, and the result is known as a work curve (Figure 72).

Some of the simpler skills that have been studied[12] are tapping, crossing out letters or digits, tracing a star the reflection of which is seen in a

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[10] J. K. Doherty, *A Study of Performances in Certain Physical Activities Which Involve Persistence*, unpublished doctoral dissertation, School of Education, University of Michigan, Ann Arbor, 1947.

[11] L. Carmichael and W. F. Dearborn, *Reading and Visual Fatigue*, Boston: Houghton Mifflin, 1947.

[12] G. M. Whipple, *Manual of Mental and Physical Tests: Part II, Complex Processes*. Baltimore: Warwick and York, 1915.

mirror (mirror-drawing), substituting one set of symbols for another, telegraphy, and typewriting. Certain general conclusions have been drawn from such experimental studies:

1. There is always improvement with practice.
2. There is wide variation among individuals.
3. In general, women tend to obtain slightly better scores than men.
4. The progress of any one individual is irregular showing minor fluctuations from day to day instead of continuous improvement. These fluctuations are produced by chance factors such as variations in the subject's physical condition or motivation.
5. Many curves reveal what is called a plateau, an extended period of relatively slight improvement or none at all.
6. There is a theoretical limit of improvement for every individual.
7. Progress is rapid at first and becomes more gradual.

Plateaus, limits, and the rate of progress call for a little further comment.

A *plateau* may be due to general fatigue or boredom. Bryan and Harter, in their pioneer experiment in learning to send and receive the Morse code, ascribed it to the process of acquiring what they called a "hierarchy of habits."[13] Fairly continuous progress was made while they were learning the single letters ("lower-order habits"). But thereafter there was no gain in speed until these letters were learned in groups of syllables, words, and phrases ("higher-order habits"). Plateaus are shown at the "critical stage" in Book's early experiments in learning to type-write (Figure 72). Later experiments have concluded that the plateau occurs as a rule when simpler skills are brought together into a complex pattern of movement. Learners are less apt to become discouraged if they know about plateaus. Otherwise they are likely to think they have improved as much as they can, that their limit has been reached, and that it is therefore useless for them to continue practicing.

The *limit of improvement* is indeterminate for the race as well as for the individual. World's records are constantly being broken, but conceivably there is a physiological limit to improvement in any skill that no individual can hope to exceed. This limit unquestionably varies for different people. But for each one there is always the question as to whether further improvement would be worth the time and effort it would take. If one can hold his job and doesn't aspire to promotion, or if he can play well enough to enjoy playing, it may well be that the effort to approach more closely to the physiological limit would be

[13] From W. L. Bryan and N. Harter, "Studies in the Physiology and Psychology of the Telegraphic Language," *Psychological Review*, vol. 4 (January, 1897), 27–53.

unwise. It becomes a problem for the schools to determine the level of performance at which they should aim owing to considerations of cost as well as of time. In general, it may be said that the effort is made to bring all pupils up to a level of general competence. For special groups, the vocational skills are taught up to the point where expensive machines would be needed that would be used by only a few, and in the arts and in athletics there are wide variations with seemingly greater public tolerance toward financial expenditures for the latter.

The general progress of learning remains yet to be noted. The curve of improvement in typewriting (Figure 72) exhibits the characteristic
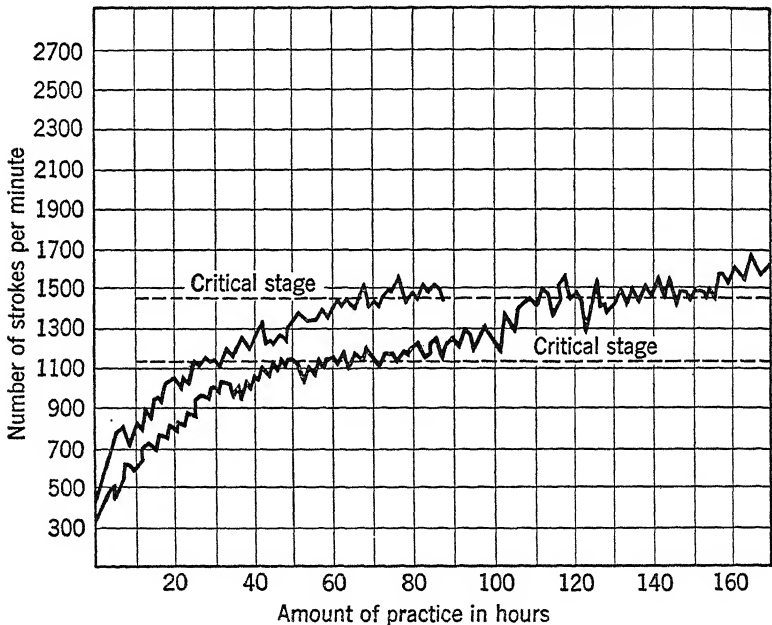
Figure 72. Improvement in Typewriting (From W. F. Book, *The Psychology of Skill, with Special Reference to Its Acquisition in Typewriting.* Chicago: Gregg, 1925. Reprinted by permission of the Gregg Publishing Company.)

form. This is usually described as initial rapid progress which becomes more gradual (negative acceleration) until the limit is reached. The convex shape is due largely to the fact that many of the necessary motor coordinations have already been acquired over a long period of time beginning in early infancy. In the case of mirror-drawing, for example, the elements are all known; the reversed spatial relations are familiar to anyone who has used a mirror, and tracing is a childhood accomplish-

ment. In spite of the difficulties encountered, the task is already more than half learned before it is begun. If it were possible to start more nearly at the beginning, the curve would probably first show a gradual rise and *positive acceleration*, changing to negative. The total process is illustrated in Figure 73. Previous or incidental learning, then, may be thought of as following the line from 0 to 0′. If this hypothesis is correct—and other evidence tends to support it—it may be concluded that progress toward the limit of improvement in learning under controlled conditions follows the concave-convex or S-curve, but, as usually measured, it displays fluctuations and, often, plateaus. It will be noted that this curve has the same general form as the curves of growth presented in Chapter VII.
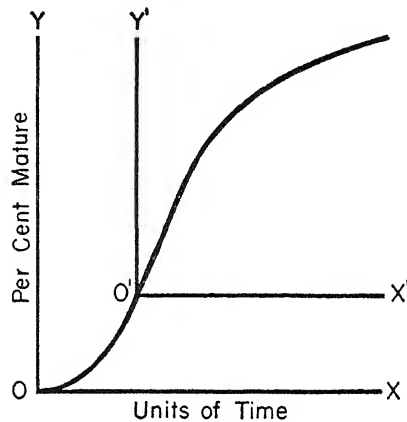
Figure 73. Theoretical Learning Curve The familiar "initial rapid rise" is due to previous incidental learning, represented by the line *OO′*.

4. PERFECTING A COORDINATION

Multiple Response. The motor skills that have been studied in the laboratory are relatively simple, and attention has been focused on the end product, the speed with which the act could be performed. But the teacher or coach, in order to develop speed or precision, or whatever is demanded, must analyze the learner's performance to discover, if possible, what he is doing wrong and help him to correct it. Motor coordinations have much in common, even though the skills vary widely. It will be desirable to note what some of the common factors are.

Basically, a muscular coordination is a space-time pattern, a segment of behavior. The organism can make any one of a number of more or less well-coordinated responses to a single stimulus situation according as one or another part or figure is singled out to be responded to. Response to a part of a situation is referred to as *partial* or *piecemeal* activity. The beginner, without benefit of instruction, will respond to some part or phase of the total situation, perhaps the wrong one, and his response will be something that is in his repertoire of responses. If he hits the ball, approximates the note, or saws the board, or taps the right key, he achieves a certain degree of success which rewards his

efforts, and he will be likely to continue in the same way. Obviously, if he practices enough even in wrong ways, he will improve, but he will not improve as much or as rapidly as he would if he practiced what are known to be more effective ways. The following analysis shows what the steps are that must be attended to under instruction in order that he may perfect his coordination and so develop his skill.

Set. The state of bodily readiness for a particular response has been discussed earlier. In the motor skills, it is variously referred to by such terms as posture, stance, or position. "The weight rests evenly on both feet, which are placed about eighteen inches apart," or "The upper arms hang comfortably from the shoulder, with elbows bent at slightly less than a right angle, fingers on the guide keys." Such directions are familiar to anyone who has ever learned a motor coordination. Sometimes, as in golf or typing, in the serve in tennis, or in starting a race, there is plenty of time to assume the correct set, while in other situations it must be taken quickly and constantly shifted. One of the chief weaknesses of unskilled tennis players, for example, is that they are not able to get in position for a forehand or backhand drive, so they hit the ball while out of position or off balance. To get set correctly is a good start, but it is only a start. The learner is all ready to do something.

Perception of the Significant Stimulus. The signal that determines just what he will do and when he will do it is sometimes quite simple, as in a foot race. He is to do just one thing, namely, tear down the track as soon as the starter's gun goes off. But even this has to be practiced again and again. Sometimes the situation resembles that of the choice-reaction experiment in which the subject is all set to press one key if a green light flashes and another if a red light flashes: "If the ball is tipped in your direction, try to get it; if in another, guard your man." "Be ready for a punt or a pass." Sometimes one has to "be ready for anything!" When ready to type, any letter, number, or sign may come up, and similarly in music—the score gives the "signals" and indicates when the response is to be made, that is, when the notes are to be played. Hence the learner must practice so as to play any note or combination of notes instantly.

Obviously, it is very important to perceive the signals aright, otherwise the most egregious errors are made, even assuming one could make the correct response if he perceived the situation correctly. If one doesn't "see" the man on third, the repeat sign, the knot in the wood, there will be trouble. The teacher or coach must familiarize the learner with the

various aspects of the situation that he must be alert to recognize so that he can govern his responses accordingly.

Type of Movement. Analysis of the types of movement involved in the motor skills reveals that there are three categories: fixation, slow movement, and fast movement.[14] *Fixation* is ideally no movement at all; rather, it is a bodily coordination in which opposing muscle groups are contracted against each other as when one tries to follow the command to "hold still." Posture and steadiness require this kind of "action," though it is impossible to attain it completely, as may be readily demonstrated if one attempts to stand without swaying, or to hold a pencil point motionless an eighth of an inch or so above a dot on a piece of paper while the forearm is supported only at the elbow. The precision required in such tasks as watch repair, lettering, or microscope work requires this kind of "movement," which can be reduced by shortening the lever—that is, by supporting the wrist or fingers instead of the elbow.

Slow movement is the same as fixation but with uneven tension so that motion in the desired direction results. The characteristic of slow movement is that it is controlled; the direction can be changed at any point.

Fast movement may not be changed much in process, but instead is largely determined by the set of the individual before it starts. It may be under tension, the energy being supplied throughout its course, as when one starts from a fixed position in a race, or in dealing a blow in boxing. Or the energy may be supplied only at first, followed by relaxation, which allows the moving member to travel the rest of its course on its own momentum. This second kind is called the *ballistic movement* and will be discussed in more detail after brief consideration is given to the termination of the movement.

There are three ways to stop a movement. One is to let it go until it won't go any farther, as when one tries to touch his toes without bending his knees, or, standing erect, swings his arms backward in a horizontal position as far as they will go. The movement is stopped by the ligaments and passive muscles. The hip swing in golf, which becomes more difficult with increasing age, is an illustration.

The second kind of movement termination is produced by the contraction of antagonistic muscles, as in a gesture like pounding on the table if there is no table, or in swinging the arms back but stopping them at the plane of the body. Eye-movements, rowing, swimming, bowing string instruments, and trombone playing are other illustrations.

[14] R. H. Stetson, "Mechanism of the Different Types of Movement," *Psychological Monographs,* vol. 32, No. 3, 1923, 18–40.

In the third kind of termination, the moving member is stopped by an obstacle or block, when the antagonistic muscles may contract to return the member to its original position in order that the motion may be repeated. This is illustrated in driving a nail, chopping wood, playing a drum or piano, in typewriting, or in fingering string instruments. It should be pointed out, however, that in many skills where there is a block the second method of stopping is often better employed, as in keyed instruments, which means that the antagonistic muscles go into operation before the block is actually encountered, thus speeding up the action.

The Ballistic Movement. The form of rapid movement in which the force is applied at or near the beginning and then removed has been called the ballistic movement from the analogy of the projectile. The course of such a movement is determined by the original direction given it, though in addition to gravitational forces the momentum of the movement is controlled in part by the nature of the musculature involved. In many unit skills requiring rapid movement, it is important for the learner to employ this form instead of that involving tension throughout. The momentum of the free-moving member permits the necessary state of relaxation of the musculature so difficult for the novice to attain.

Since the fingers, arms, or legs are attached and hence do not continue hurtling through space, stopping the movement is quite as important as starting it. Here the analogy of the projectile may again be used. If shot up into the air, when its momentum is spent it no longer goes upward; however it doesn't stop in midair, but gradually curves back toward the earth. Thus, in the ballistic movement, the stop and return should be thought of as a curve, to produce which the ligaments or the relaxed or antagonistic muscles begin to operate as the momentum decreases.

Swing, timing, and follow-through are terms applied to various aspects of this movement. They relate to the total coordinated response and may be illustrated by the approach shot in golf. The motion of the club largely follows from the momentum induced by the force applied at the beginning, and it continues after the ball is hit, though at this point the task is supposedly completed. Of course it is not the club that is responsible for the movement. The stroke is not a whack that stops when the ball is hit, but is a swing in which the head of the club describes a partial circumference with the shoulders as a center. The momentum is gradually stopped by the ligaments and passive muscles, since there is no necessity for a quick return for another stroke.

The principle is the same, but the termination is different in the bowing of string instruments. The movement is not just back and forth, stopped by ligaments and passive muscles. Instead, the ballistic up-bow thrust is followed by the relaxed, momentum phase which continues as a follow-through after the note is ended while the antagonistic muscles begin to exert similar pressure for the down-bow, and so on.[15] The finger motions in typing likewise follow the ballistic movement, if properly executed, the finger shooting to the key, relaxing, stroking the key, and circling back to position for the next stroke. There is an opportunity for a great deal of experimental work to be done on the ballistic movement to enable teachers and coaches better to understand the coordinations they are perfecting in their pupils, and hence to furnish them with more adequate instruction. Undoubtedly, some of the more skillful teachers achieve the desired objectives with the more talented learners, but it is probable that many others do not receive the kind of instruction that would enable them to develop their skills as well as they otherwise might.

Relaxation. One of the familiar problems of all those who teach any motor skill is to get the learners to relax. In handwriting, playing a musical instrument, golf, swimming—it matters not what—the beginner contracts more muscles than necessary, he "tightens up," strains, "presses," and so performs awkwardly and tires himself out while he fails to progress. He may be able to relax while lying down, but when he is in the water—that is a different matter.[16] If told to relax during practice, he doesn't know how, and either doesn't relax at all or does it at the wrong time with the wrong muscles. The difficulty may be simply illustrated by carrying a bucket of water. If it is carried in the right hand, the tendency is to stiffen the muscles of the other arm. In this case it is a simple matter voluntarily to relax these muscles and note how much more easily the weight is carried.

Good form as well as good performance demands relaxation. The ballistic movement, in which relaxation, as a rule, follows the initial thrust, indicates one instructional approach. Another lies in maintaining proper balance, in the process of which the right coordinations can be acquired. Reducing the psychological pressure to improve one's performance too quickly is another. Sometimes fear or other emotional

[15] Leo Lemke, *Improvement in Playing the Violin through Instruction in Phrasing,* unpublished doctoral dissertation, School of Education, University of Michigan, Ann Arbor, 1945.

[16] H. W. Copp, *Swimming as a Motor Skill,* unpublished doctoral dissertation, School of Education, University of Michigan, Ann Arbor, 1939.

excitement may be the cause of tenseness, in which case a reconditioning process is required.

Speed vs. Accuracy. Another recurring problem for those who give instruction in certain motor skills is to decide whether they will emphasize speed at the expense of accuracy, or whether they will slow the learner down so that his mistakes are minimized. The problem comes up in relation to eye-movements in reading, in handwriting, speaking a foreign language, typing, music, and in other skills. The earlier psychology taught that each response should be correct, because repetition followed by success hammers it in, and wrong responses, if practiced, will therefore be learned. This principle still holds true to a considerable extent. And yet under certain circumstances habitual responses of long standing will be quickly abandoned when an easier way is found. This is no more true for rats when a short-cut is opened up for them in a maze than it is for people, who gladly shift to vacuum cleaners, washing machines, and tractors, for example. But these represent completely different ways. A person's handwriting remains much the same even if he does take up the typewriter. Dunlap has shown that, under certain circumstances (when the writer says to himself, "This is the wrong way") repetition of typing errors tends to eliminate them. Some instructors in typing have tried allowing pupils to go somewhat faster even though they make mistakes, and have scored them on the number of lines typed correctly, thus not calling attention to errors, but emphasizing correctness, and with promising results.

Certainly, in other skills it is no problem. In baseball or swimming, for example, no coach insists that youngsters go slowly enough to make every move correctly, nor does the singing teacher insist that each note be perfect before allowing the pupil to go on to the next. The principle of progressive approximation operates in these areas, and errors gradually drop out as instruction and practice proceed. We do know that, in verbal learning, calling attention to errors tends to cause them to be repeated. It may be that something similar takes place in the skills. At any rate, though accuracy is desirable, there are apparently various ways to attain it. An intermediate scheme that has some evidence in its favor is to take time between strokes in typing, or notes on a musical instrument, that the learner may decide where the finger should be placed next, and then move it there with the greatest possible speed. Thus one gains practice in rapid, precise movement or "technique" without sacrificing accuracy.

Integration and Individuation. In discussing the development of a motor coordination, it now remains to consider how the complex,

skilled performance actually takes shape, how the body learns to go through the routine that it could not perform originally, with the proper form or speed that is demanded. We have seen that the performer gets set to do something of the sort, whether he has any skill or not. We have seen further that some kind of stimulus starts the activity. The response is what he can do. This is important, since every skilled act is based on some fundamental performance that has earlier developed or been acquired, such as walking, running, jumping, swinging the arms, moving the fingers, yelling, verbalizing, and the like, and what remains is to modify the movements involved in certain ways. Since a large number of movements have to be coordinated and timed exactly, the chances are all against doing it correctly at once, for one can attend only to a very limited number of separate movements at a time. Improvement comes by progressive approximations, as earlier stated.

One way to improve is to take one part of the total coordination at a time, and practice that, like the mimetic or imitative skills in calisthenics, as, for example, the kick in swimming, or falling on the ball, or the approach shot. When such movements are relatively separate, this procedure works fairly well; it is essentially a skill in itself. Such a procedure becomes almost ludicrous, however, in pole vaulting, tumbling, or in singing, since, to perform any part of the act, the whole act has to be run through. Even when part skills can be performed separately, they are not quite the same as when they are actually a part of the total performance. It is not the same thing to kick one's feet while holding firmly to the rim of the pool that it is when one is supported only by the water. To the extent that the part skill can be practiced separately and then, as it were, inserted into the total performance, improvement may take place. Such a procedure is referred to as integration. The part is integrated into the whole.

The opposite approach is that of individuation, in which the movement develops as a part of the total coordination and gradually becomes individuated or individualized so that the performer can modify it more or less at will in the process of performing the total act. Thus, to use the illustration of swimming again, the learner kicks as best he can while he swims (perhaps at first with the aid of a rubber tube) and gradually changes his kick at the direction of the coach to bring about a better total performance.

The concept of individuation was met with before in connection with the discussion of the development of fetal movements, following Coghill's experimentation (Chapter IV). In this case, however, the finer "arm" and "hand" movements of the fetal salamander developed later from, and as a part of, the total swimming movement because of

the later growth and myelinization of the neural connections. This condition does not hold, of course, for a child learning to swim. His neuromuscular connections are all previously established. However, the situation is analogous, since the body making an arm (or leg) movement in swimming is not doing the same thing as it is when it is making "that movement" on land, or when standing on the bottom in the shallow part of the pool, or when grasping the rail. The part movement is in reality a part of a more complex performance. From this point of view the coach will, so far as possible, get the learner to develop the necessary skills while performing the total act, while playing the game.

Clearly, neither approach is entirely satisfactory by itself. It is necessary to stop, sometimes, and correct some part that is wrong, and then "integrate" that part in the on-going activity. It is also necessary to observe what one is doing and make corrections without stopping. The skilled performer has such a command of his movements that he can make any one of them change in any kind of wrong or different way that he may wish, but such skill comes only after long practice.

5. THE LEARNER'S CUES

Cues from the Teacher or Coach. In the preceding discussion of the process of acquiring a motor coordination, the important part played by the teacher or coach has been implied. For it is his responsibility to see to it that the learner somehow makes the correct motions, but he must gradually shift the responsibility to the learner. There are three ways in which the teacher can help the learner to approximate the correct performance of a motor skill. These may be called the manual, the demonstration, and the verbal.

Following the *manual* method, the teacher takes hold of the learner's hand or foot or his club, racket, bow, or whatever implement is used, and moves it through space following the desired form or pattern. Or he may lift the pupil's wrist, elbow, and so on, to the correct position. Such a procedure, though occasionally helpful in getting the learner to realize the movement he is supposed to make, has one chief disadvantage: the learner is not making the motion himself, but instead is passively following. When the coach's hand is removed, he has nothing to follow, so there is apt to be no great improvement the next time he tries it alone.

The second way for the teacher to get the pupil to approximate the desired movement is to *demonstrate* the correct performance. "Do it this way," he says, "Watch me," and the pupil watches and tries, perhaps with some success. If so, he will be told, "That's right, that's more like it, now try it again." It may be, however, that the pupil will not

know what to watch. It all looks so easy when the expert does it. So the teacher says, "Watch my elbow; see, my head doesn't move," or "Watch the club," or "Place your fingers this way," according to the skill being learned. This method may be modified by *exaggeration*. The teacher makes the motion slowly, exaggerating either the correct movement or the pupil's erroneous way of making it.

Motion pictures are coming more and more into use to supplement the demonstrations that can be given by the teacher or coach. For sports, films may be considered in three categories. The orientation film allows the pupils to see good players in action in the actual game situation. The demonstration film proper focuses on expert form; and although it may be commercially made or teacher-made, it is particularly valuable for the more advanced learners in order to call attention to certain techniques the teacher may wish to emphasize. The diagnostic film gives the learners a picture of their own performance. They can see themselves in action and perceive more clearly the differences between their performance and that of their classmates and the experts. For all purposes, slow motion is essential, revealing as it does the motions that are unobservable at the regular rate of speed, and giving the learner a chance to realize the nature of the total coordination. Recordings are similarly used for vocal skills, especially for foreign language pronunciation.

Valuable as this method is, the capacity of the learner to imitate a skilled act is definitely limited. To take an extreme case, few could execute a back flip merely by watching an acrobat do it. Young musicians are helped little in developing good tone by listening to the teacher sing or play. They may think they are blowing a sweet note into the horn, but it comes out so sour!

The teacher must also employ *verbal* instruction. It is his task to say certain words to the learner, and these words must serve as a stimulus to call out the desired response. At least this is the idea, and in many cases it is quite effective: "Take it easy—Don't bend your left elbow—Press the space bar with your right thumb—Place the tip of the tongue against the front teeth—Keep your head down"—and so on. Such directions as these, coupled with manual help and demonstrations, are, of course, very effective, as evidenced by the high pitch of perfection which many pupils are able to attain.

On the other hand, there are many people who take lessons but never succeed in doing very well. There are more dubs at sports than there are skilled athletes, more bungling workmen than masters of their craft. Foreign languages are spoken with queer accents, and songs are sung

and instruments played (if learners get that far) with less enjoyment for the listeners than might be desired. One is led to suspect that there is something faulty in the instruction, though the learner is usually blamed for his lack of skill: he did not practice, he has no talent, or he is stupid, and so on. It might be that the teacher did not know what to say to the learner to call out the correct responses.

A careful check of swimming errors and verbal directions given showed that some beginning swimmers actually did worse after the coach had given them certain verbal directions than before. The cue that was intended to help them interfered with their progress instead.[17] Some workers in industry were unable to perform a simple mechanical adjustment rapidly enough to keep up with the others. They were "dubs." When their motions were analyzed it was found that certain changes (such as taking hold first with the left hand instead of the right) brought their performance up to the level of skill demanded. They were not lacking in "mechanical intelligence." They had merely happened to start the wrong way and had kept on until they were shown a better.

The study of music presents an interesting case. "Play it with more life and spirit, Put yourself into it, Play with more verve . . . delicately . . . lightly . . . Support your tone from the diaphragm . . ." and so on and on. With all due respect to the teachers of music who say such things, what is the pupil going to *do* to follow directions like these! If he hits on the right coordination, he is lucky; if he doesn't, like the mechanical worker, he goes on doing it the wrong way.

Cues from the Learner. The learner must gradually take over the guidance of his performance from the teacher. He must himself be able to tell whether he is performing correctly or not. For this he has three sensory avenues, the visual, the auditory, and the kinesthetic (supplemented by the static and tactual).

The *visual cue* enables the learner to see where his fingers, hands, arms, and feet are in comparison with where they should be at any given time as demonstrated by the teacher. "Check up on your feet," was one direction given to a group of recruits learning the "about face." But it was not necessary to look for them after a little practice. Diagnostic films taken of the learner himself have been found to be very useful, perhaps because identification with the film is easier than with the instructor. "Did I really do it that way!" they exclaim in embarrassment. "I see what I did wrong," and improvement is apt to be rapid.

[17] R. H. Hagelin, *An Investigation to Determine the Effectiveness of Certain Verbal Cues in Teaching Swimming to Non-swimmers,* unpublished Master's thesis, School of Education, University of Michigan, Ann Arbor, 1947.

The *auditory cue* is similarly useful, particularly in music and speech. The pupil must learn to distinguish differences in the sounds he makes which he had not earlier noted, whether in pitch or intensity of tone, or in the pronunciation of sounds. If somehow he can be induced to make the sounds correctly, he can hear them and so form an idea of what they should be and tell when they are wrong. For example, the German *ü* is difficult for most Americans whose teachers (if they can make it correctly themselves) proceed by demonstration usually quite fruitlessly. However, if they are told to form their lips as they do when they whistle, and then say *ee*, this verbal cue will enable them to make the sound correctly in spite of themselves, and they can thereafter recognize it or deviations from it by the sound they make. Recordings of a learner's speech and other tones have a use similar to that of motion picture films of their performance, and are employed by many speech and music teachers not only to keep a record of progress, but also to help eliminate the errors.

The *kinesthetic cue* is the most useful and effective in developing motor skills, for, as the learner improves, it gradually takes over from the visual or auditory, or it may be the chief reliance at the start. True, one must be able to see the ball in order to catch or hit it, and see where the man is (or will be) in order to throw the ball to him. But the actual catching, hitting, and throwing can be done with the eyes closed, and one can tell by the feel how good the coordination is. In fact, in one experiment subjects who were blindfolded developed more rapidly in golf than those who were not,[18] revealing the dubious value of the well-nigh universal adjuration to "keep your eye on the ball." Similarly, in shop and in music, though sight and sound are necessary in following a pattern or keeping with others, the actual unit skills—hammering, sawing, drawing the bow, placing the fingers on the keys, and so on—are kinesthetically directed.

Cues from the Environment. The learner, in order to evaluate and improve his performance, may watch and listen to the teacher, he may watch or listen to his own movements or their results and note how they feel kinesthetically. He may also need to obtain cues from the environment to determine whether what he is doing is right or wrong, or to indicate what he should do. These cues may be apprehended directly through kinesthetic, tactual, or static senses, as in sailing, surf-board riding, or following in social dancing. It may be that one's coordination

[18] C. R. Griffith, *Psychology and Athletics*, New York: Scribners, 1928. See also *Psychology of Coaching*, New York: Scribners, 1926.

is good enough, but the tool one is using needs sharpening. One must be able to hear when the instrument he is playing needs to be tuned, and be able to see and judge distances, as in fielding and in dodging or broken field running; he must decide when to use a mashie, when to play forward or back, when to use a smash, when to come about or jibe, and so on. It may be that he should modify his tactics to play on his opponent's weakness, or to avoid being overcome by his opponent's strong points. He may decide to run faster at first to tire out his opponent, or to run more slowly at first and spurt on the home stretch. In group games the location and tactics of the men on the opposing team, where they happen to be at the moment on the field or court, the position of the ball, and who has possession of it—all are determiners of what should be done next. The teacher or coach points these matters out to the beginners and often drills them on what they should do under such and such circumstances. The pupils or players, however, must be able to perceive the different situations when they arise and, in most cases, learn to respond immediately and, after a while, automatically. In many other cases, however, although decisions may have to be swift, they are decisions, nonetheless, and involve understanding and problem-solving.

To take a simple illustration—when a grounder is hit, the infielder who gets it ordinarily throws to first base to put the man out. However, if there is a man on third, he throws it home to put out the man running from third or to keep him from scoring. But, if the man on third has decided not to take a chance and starts to run back to third, he should throw to third to get him there if possible. While he is catching the ball he must perceive the situation and then act accordingly. The situation is further complicated by men on other bases and the possibility of making a double play. In football, crucial decisions are called for— whether to try a line plunge, a pass, or a drop kick, for example, depending on the score, the time left to play, the ability and condition of the opposing players, what they are probably expecting, and so on. The players must get set to do what the signal calls for, while the opponents must be ready for anything. Their actions are determined by what they can perceive is happening. Illustrations could be multiplied, not only in sports, but also in shop and laboratory work.

How does the learner determine when to use one or another of the various skills he has acquired? As has been pointed out, the teacher tells him at first, just as the teacher tells the pupil when to use a comma or a capital letter. It is associative learning—when you see this, do that. It also involves perception. The learner must perceive that this situation, and not some other, is present. But every situation cannot be planned out

beforehand, so the learner must understand the principle involved and be able to apply it under varying circumstances. As in other problem-solving, the conditions may be such that the principle is not applicable. So the player loses a point for his team, or the shopworker spoils what he is making and has to start again. As he gains in experience, however, the learner makes fewer such errors in judgment, just as he makes fewer errors in the performance of the actual motor skill.

6. TRANSFER AND RETENTION

Interference and Facilitation. The question sometimes comes up as to whether training in one skill transfers to another. The answer, as in the case of transfer in symbolic learning, depends on the similarity of the components. It is doubtful if skill in football would transfer to playing a piano. However, skill in football would undoubtedly show positive transfer to soccer, and skill in playing the piano to the pipe organ. But at first, and perhaps for some little time, there might be some interference. The football player might find himself catching the soccer ball as if it were a forward pass, while the pianist might forget to hold down the keys or to use his feet. A baseball player, practiced in hitting a moving target, will have little difficulty in hitting a tennis ball, but he is likely to feel impelled to use both hands on the racket and knock the ball over the backstop. The similarity of the two situations may call out the practiced response, which may or may not approximate the correct one. The teacher may have to point out and teach the differences, and the learner, employing the various cues, must make adjustments accordingly.

Retention. Some have at times wondered why the things learned in school are so quickly forgotten, while skills, such as riding a bicycle or swimming, once they are learned, seem to be permanent acquisitions. The wonder, however, seems to grow out of a false comparison. Bicycle-riding and swimming are relatively simple responses that have been many times repeated, while the items of knowledge are complex and numerous, and many of them have not been overlearned. A better comparison might be made between bicycle-riding or swimming and writing a capital letter A or giving the date for the discovery of America.

As a matter of fact, the complex skills are not retained except as a result of constant practice. Paderewski, the great pianist, is reported to have said that if he failed to practice one day, he knew it; if he did not practice for two days, the critics knew it; and, if he let three days go by without practicing, everybody knew it. A residue of skill is retained, even though the general level drops back, probably because there are

few conflicting inhibitory experiences of the sort found in verbal learning.

The Age Factor. One matter is certain, however, and that is the progressive decline in physical prowess with age. A person usually reaches the peak of his ability in the twenties, and, though he may retain enough to continue for some time, particularly if his skill was of a very high order, he is an old man at thirty and as a rule need not hope to compete professionally much longer. Fortunately, however, skills that are less exacting physically than, say, football or baseball, may be enjoyed for many years, including sports like badminton and golf, shop skills, and arts and crafts, including music and painting.

7. ACQUIRING MOTOR COORDINATIONS

Visual Coordinations. Motor skills occupy an important place in the school program. The principles that have been discussed in this chapter apply more or less directly to them all, but they will be considered individually in this section in order that some of the specific conditions under which the principles operate may be pointed out. They are classified roughly according to the musculature involved and the nature of the product.

The muscular movements involved in the sensory exploration of stimuli call for little training except in the visual sphere. For the human species, "to incline the ear" is a figurative expression, while the senses of smell and taste take care of themselves well enough, except for the necessity of enjoining caution in the chemical laboratory or in the presence of too hot foods, respectively. Tactual discrimination develops naturally, but, with the exception of similar cautions in the case of such things as edged tools, fingering and manipulation in order to bring characteristic features of the stimulus object in contact with the end-organs are relatively simple processes, though there is an exception in the case of the teaching of Braille to the blind.

Eye-movements, however, have been shown to be important indicators of reading progress, and techniques for increasing the speed of reading have been introduced into many instructional programs. The experimental work on eye-movements in different perceptual situations has been among the most interesting of any in sensorimotor coordination.

If you watch the pupils of someone's eyes while he is reading, you can see that they do not sweep across the page with a single movement, which would result in a blur; instead, they can be seen to move along

jerkily, stopping for a moment at various points in their progress. This motor aspect of reading naturally attracted the attention of psychologists, who wondered why the eyes stop where they do, and what relation these *eye-pauses* or *fixations*, as they are called, have to skill in reading. When this alternation of movements and pauses was first reported in the latter part of the preceding century, it was thought there was a uniform pause to every ten letters. It has since been discovered that such regularity is only approximated, even in the case of the mature reader, and that there are very great differences between individuals. Furthermore, it has been found that about twelve-thirteenths of the time the eye takes to read a line of print is spent on these fixations. Only during this time is perception possible because of the rapidity of the movements between the fixations.

The techniques of eye-movement experimentation have improved considerably since the first observations were reported. Later experimenters recorded eye-movements with the aid of a little attachment to the closed upper eyelid which made a faint sound each time the bulge of the cornea moved, enabling them to count the movements. Another investigator employed a more exact and heroic method. He attached a plaster of Paris eye-cup and aluminum pointer directly to the cornea of the reader's eye, connecting it with the smoked drum of a kymograph. Subjects are easier to procure for current experiments employing a beam of light thrown upon the cornea and reflected upon the moving film of a camera, or electrodes attached to the face. During the fixation, as the film or paper rolls past, it shows a short vertical line, and during the eye-movement a short almost horizontal line. A perfected technique enables the experimenter to determine at just what points on the printed page and in what order the fixations occur. It has been found that the successive fixations, instead of moving regularly along the line of print, frequently cut back to words already passed. Such movements are called *regressions,* and tend to appear frequently in the reading of the immature, or better, when the material read is difficult for the reader owing to the presence of unfamiliar words or ideas. Children in the first grade, on the average, make about 15 fixations per line with 4 regressions. Improvement is fairly constant throughout the grades to the sixth where pupils make 7 fixations with 1.5 regressions. After this, improvement is normally much slower, college students making about 6 fixations and 0.5 regressions. It should be urged, however, that slow or faulty eye-movements are a symptom and not the cause of poor reading. Figure 74 illustrates the sort of thing that is found when different subjects read somewhat similar material. Even more striking results were obtained when foreign languages were substituted for English. Whatever the

But the dog would not go home. The little

boy said, "I cannot go home without my

dog." Then he began to cry.

window. Peter could see everything in the

room. All at once he heard a noise. Peter

opened his eyes. He saw that the room had

grown dark. Something was outside the

Figure 74. Photographic Record of the Eye-Movements of a Poor Reader (above) and of a Good Reader (below). The numbers above each vertical line show the order of the fixations; those below, the duration in twenty-fifths of a second. (From G. T. Buswell, "Fundamental Reading Habits; A Study of Their Development," *Supplementary Educational Monographs*, No. 21, June, 1922, pp. 2–3. By permission of the University of Chicago Press.)

pupil whose eye-movements are recorded in Figure 75 was doing, it can hardly be said that he was reading!
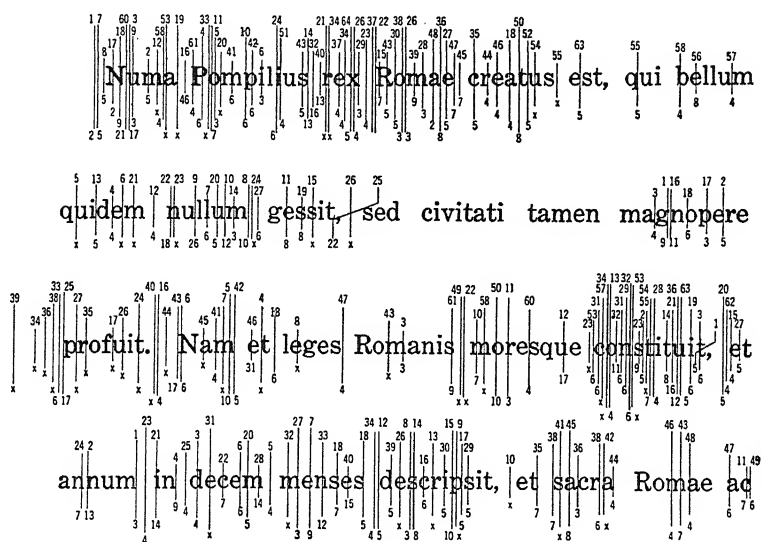
Figure 75. Record of a Subject Reading Silently a Simple Latin Passage. (From C. H. Judd and G. T. Buswell, "Silent Reading: A Study of Various Types," *Supplementary Educational Monographs*, No. 23, November, 1922, 130. By permission of the University of Chicago Press.)

Further technical developments have made it possible to photograph the movements of the eyes when an individual is looking at a picture (Figure 76). The interesting finding here was that the eye does not as a rule move naturally along the lines of interest in the way that art critics frequently describe, but instead the gaze seems to jump back and forth from one part to another, returning most frequently to the points of greatest interest in the picture.

Eye-movement studies in reading music have also been reported (Figure 77). It has been found that they follow the same pattern as in reading: frequent pauses of long duration and many regressions for immature or beginning readers; and few pauses of short duration and practically no regressions for mature and experienced readers. The third record (*c*) shows the location of the fixations of an experienced pianist playing the bass and treble clef—only 23 pauses and 15 jumps from one staff to the other, which contrasts with 51 pauses and 36 jumps (record

not shown) for the same passage as played by the immature subject whose performance on a single line of music is shown at (*a*).
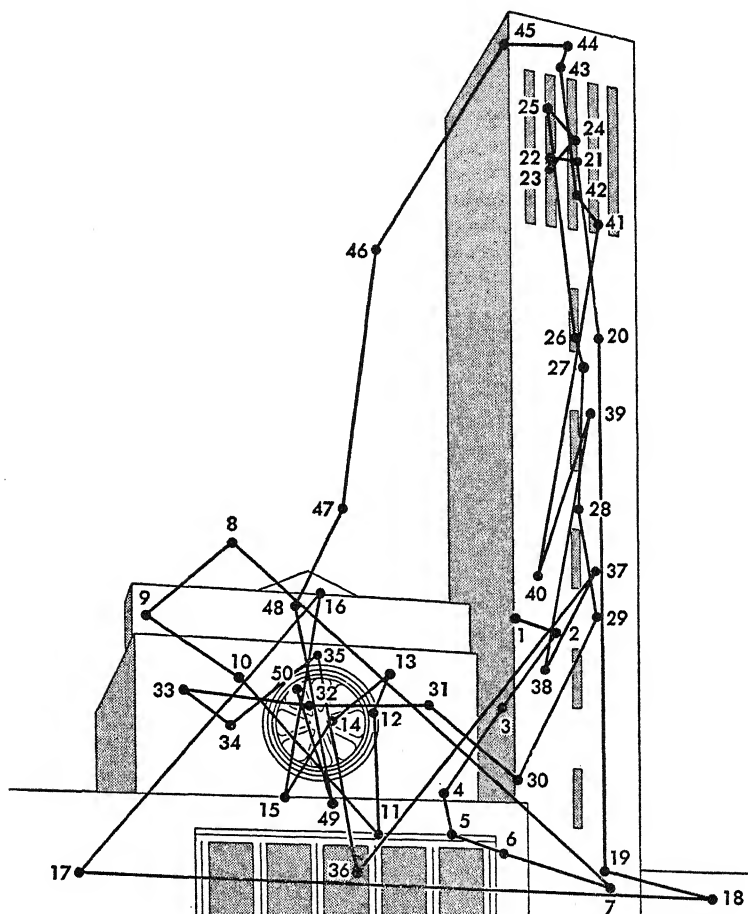
Figure 76. Record of Eye-Movements of a Subject Looking at a Picture of a Modernistic Church (G. T. Buswell, *How People Look at Pictures,* Chicago, 1935, p. 101. By permission of the University of Chicago Press.)

Various efforts have been made to apply the knowledge of eye-movements to reading difficulties. But they were not particularly successful until the motion picture film opened up a new avenue of approach. Passages are flashed on the screen, two or three words at a time, no more than enough to be apprehended in one fixation. In order to read the
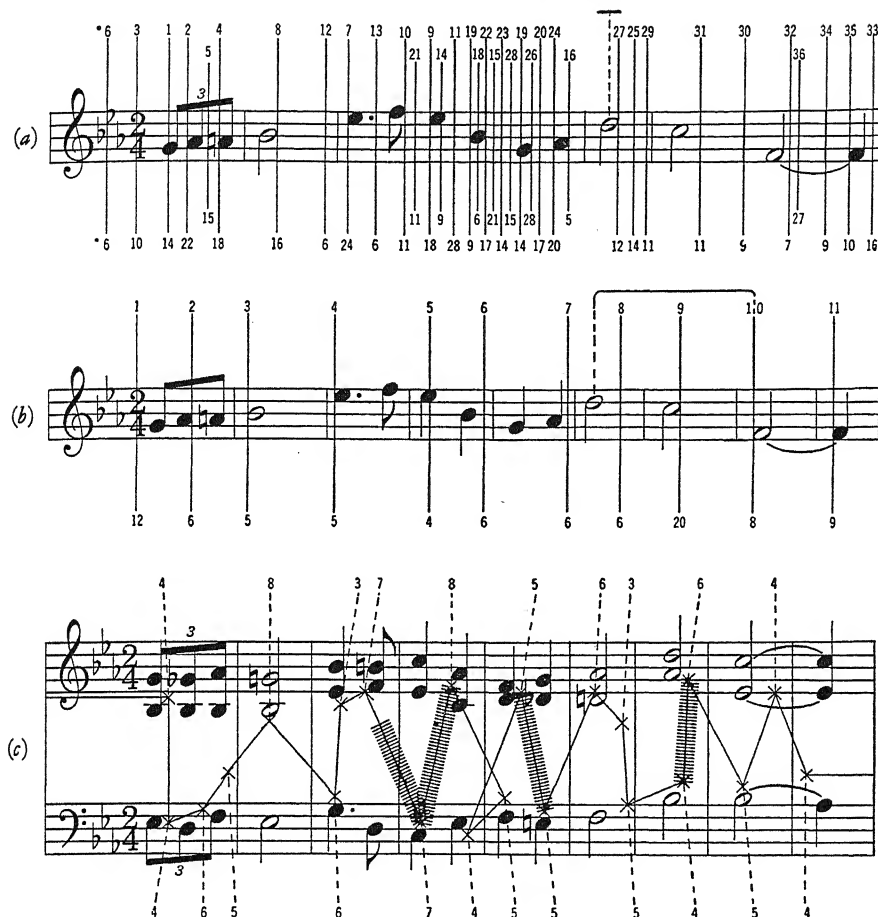
Figure 77. *Photographic Records of Eye-Movements in Reading and Playing Piano Music.* The long vertical lines indicate fixations. In (*a*) and (*b*), the numbers above the staff show the order of fixation and those below, the length in twenty-fifths of a second. (*a*) Eleven-year-old subject with one year of training in music, and no instruction in sight reading or harmony. The short line above number 27 shows that the eye-performance span is only for the half note below it. (*b*) Forty-year-old subject with eighteen years of training in music, and special study of sight-reading and harmony. The line above numbers 8 to 10 shows the eye-performance span—while the subject was playing the note between 7 and 8, his eyes were fixated at 10. (*c*) Same subject as in (*b*) playing a three-part selection. The order of pauses is shown by following the solid zig-zag line, each *x* on which represents a fixation. Vertical dash lines point to these *x*'s, and the numbers above and below indicate duration of eye-pauses in twenty-fifths of a second. The shaded part of the solid line represents the eye-performance span. (From O. Irving Jacobsen, "An Analytical Study of Eye-Movements in Reading Vocal and Instrumental Music," *The Journal of Musicology*, vol. 3, No. 1, (Summer, 1941), 1–32. By permission of the author and the Music Science Press, Greenfield, Ohio.)

passage, the reader must keep up with the speed at which successive little groups of words appear, the rate beginning between one and two exposures per second, and increasing to between three and four, just fast enough to keep him up to his best speed. This would be equivalent to an improvement of from 300 to 600 words per minute. A series of such practice periods has improved the reading rate of college students.

Vocal Coordinations. While the motor skills that need to be acquired for receptive processes are relatively simple and few in number, those involved in expression are many and complex. With the exception of the development of the manual alphabet for the deaf, these movements are primarily of the vocal apparatus—lips, tongue, larynx, vocal cords, and diaphragm. Facial movements and gestures, though important in debate, oratory, and dramatics, tend to play a relatively small part in the training for vocal utterance in the usual school program.

The chief occasion for the development of vocal skills lies in the area of *speech training.* The physiological apparatus involved in vocalization, long neglected by psychologists who were more concerned with the sense organs, was brought to the fore by the behaviorists. The advantages of its inclusion in psychological science have been amply demonstrated. Although for the child a knowledge of these intricate coordinations is about as valuable as was the suggested consideration of the proper succession of his leg movements to the centipede, for the teachers of speech and of singing it is one of the minimum essentials. Even in English classes and in foreign-language study where correct pronunciation is emphasized, it is an important element.

Most *speech* habits are developed through processes of imitation, which, however, may be voluntary or incidental. It is voluntary in cases resembling that of the farmer lad who said, "The women-folks say 'cow' and the men-folks say 'caow,' and I'm going to say 'caow' with the men-folks." It is less actively conducted where there are no such confusing discrepancies. The child picks up the pronunciation or the dialect that he hears about him; and, when he later studies French or German, he grafts on to it the Indiana, Virginia, or New York version of the foreign language that falls haltingly from his teacher's lips. While perfect bilingualism cannot be expected, it would be advantageous if teachers of a foreign language could live for at least a year where that language is spoken to insure a reasonable degree of correctness in its use.

There are, however, many defects of speech even in the use of the mother tongue which can be attributed not so much to the environment as to the peculiar form of the speaker's mouth and throat and to a lack

of proper training, as a result of which incorrect habits have become mechanized. Rasping or whistling sibilants, a nasal twang, monotony, and poor articulation are too often found, as well as more serious defects such as lisping and stammering.

Estimates of the incidence of speech defects in the school as well as in the general population vary according to the standards set up by the different surveys. However, they range from as low as 2.5 per cent to as high as 16 per cent. In one study, an analysis revealed something of the range and frequencies of the defects found (Table 18). These

TABLE 18 *Percentage of Different Types of Speech Difficulty Among College Freshmen Who Were Required to Take Corrective Work*[19]

Types of Speech Difficulty	Per cent
Oral inaccuracy and ineffective speech	35
Vocal peculiarity, hoarse, harsh, nasal, etc	21
Lisping	16
Stutter, nervous hesitancy or speech blocking	11
Foreign accent	6
Letter substitution	5
Provincial dialect	3
Deafness and oral inaccuracy due to same	2
Paralysis (associated with ineffective speech)	1

figures do not include the defects due to injuries or serious physical malformation like the cleft palate, which require prolonged treatment. For those whose speech mechanisms are normal anatomically but functionally disordered, the speech correctionist can be of great assistance, much more than can those who, for a considerable fee, guarantee a cure. The basic principles may be listed as follows: home cooperation, a hygienic regimen, reduction of emotional disturbance through attention to frustrations and conflicts, and proper drill. It is in the latter area that the teacher's knowledge of the speech mechanism comes into play. Realizing what muscle groups are not operating correctly when wrong sounds are produced, he must present such stimuli, verbal and other, to

[19] S. M. Stinchfield, *The Psychology of Speech*, Boston: Expression Company, 1928, pp. 305–307. By permission of the author and publishers.

the pupil that the latter can make the motor changes necessary to produce the desired tone. Gradually the cue may be shifted to the pupil, whose auditory or kinesthetic senses report his successes or failures and enable him to make the necessary corrections himself.

The same holds true in the case of *singing*. Recordings can be made of the learner's efforts, as they can also in speech, to enable him to hear the sounds he makes in the way he hears other sounds, unmixed with the vibrations picked up through bone conduction. To this technique has been added that of phono-photography by which the sounds of the human voice can be translated electronically into visible sound-waves, the lines of which may be observed by the student. While the apparatus is relatively simple for producing the pitch differences required in singing, the larger problem, that of producing visible speech, which includes various consonant sounds as well, has been vigorously attacked. Already a complicated apparatus produces visual patterns of words which a deaf person can learn to read, and which he can make himself, using them as visual cues to help him learn to produce the sounds correctly.

Among the interesting laboratory studies in singing are those of *vibrato*, which is defined as "periodic oscillation of pitch taking the form of a sine curve, representing an amplitude of approximately a half-tone interval in pitch, synchronizing with an equally perceptible amplitude for intensity at the rate of about six or seven oscillations per second." This elusive stimulus to the esthetic sensibilities thus ponderously defined is photographed and recorded on a special musical score called the pattern score (Figure 78). While the wavy line in the figure represents changes in pitch, observers are apparently unable to distinguish any differences between a vibrato produced solely by variations in pitch and one produced solely by variations in intensity.

Seashore declared that such experimental work is of great practical value in music instruction.[20] Further improvement in the teaching of music is made possible through the use of four instruments now commercially obtainable. The tonoscope helps the pupil to correct any tendency to sing off pitch by means of the continuous visual picture of his performance shown in relation to what should be done. The rhythmmeter is an electrical apparatus which records graphically the exact performance of any rhythmic pattern, which may be compared with the norm. The projectoscope shows instantaneously by a scale on a screen just how loud a tone is, and the synthetic tone-mixer produces mechanically any desired form of the vibrato of a tone.

[20] C. E. Seashore, "Present Status of Research in the Psychology of Music at the University of Iowa," *University of Iowa Studies*, vol. 2, No. 4, 1928.

Dubious about all such apparatus as most musicians are, so foreign is it to their training and experience, it is nevertheless high time that the light of scientific inquiry be turned upon their work. Granted that remarkable development has been made in music without it, there is no reason to suppose that the empirical methods of instruction are any better than those employed in the other subjects of the curriculum. The result would be not to mechanize a fine art but to furnish a more com-
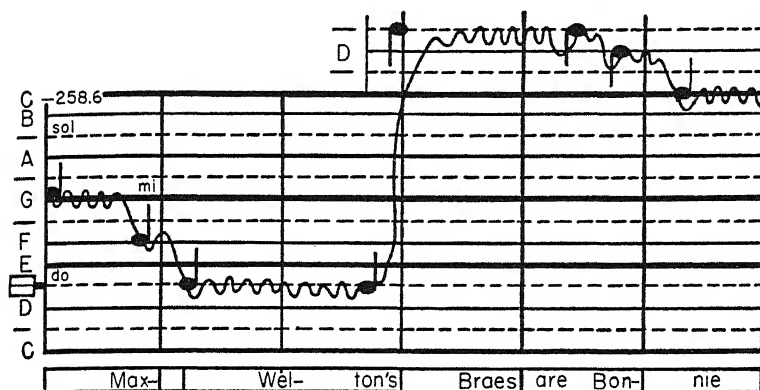
Figure 78. Vibrato The first six seconds of McCormack's rendition of "Annie Laurie," measured from a phonograph record. (C. E. Seashore, *op. cit.*, note 20, above, p. 3. Reprinted by permission.)

plete knowledge of the materials, which might conceivably make the acquisition of the rudiments, at least, more rapid and more interesting.

Most striking of the problems of the music teacher is that of the child whose pitch discrimination is very poor, particularly for the tones he himself makes. Such children, who are called monotones, have generally been regarded as inherently incapable of making sufficient improvement to join in group singing, though intensive efforts here and there under experimental conditions have been shown to be somewhat effective in making up for what was long supposed to be a natural defect. It is coming to be realized, however, that such deficiencies, as well as milder conditions such as an unpleasant singing (or speaking) voice, are not necessarily irremediable defects, but instead are the consequence of chance coordinations that have become habitual. The individual for one reason or another simply employed wrong work methods, and the confusion, noted aurally instead of visually, was the result. The usual methods of instruction have been ineffective, as a rule, in correcting the bad habits. "Do it this way," "Think the tone you want to sing,"

and like directions have been impossible to follow, and the teacher feels justified in giving his time to those with some "talent" who can profit from his instruction.

Training usually emphasizes thinking and hearing tones at the start, whereas a successful effort to improve the quality of the singing of a group of children including monotones began the other way around.[21]

This training course proceeds from the organic sensations, experienced through deeper breathing and improved circulation, to kinaesthesis, experienced through posture and control in breathing or sensations arising from muscles, tendons, and joints, to touch and pressure, or sensations arising in the larynx, mouth and tongue, and finally to auditory sensations and vision of muscle movement.

The exercises used may be illustrated by the following, together with some of the verbal cues employed: *Physical* exercises—head rolling, waist bending and relaxing, and tongue exercises. "Pretend your head weighs a ton and is so heavy it just falls from side to side." (At first, one monotone "could move her head sideways only with difficulty, and not at all backward.") *Posture* exercises—relaxed—"Pick up your chest a little." *Breathing*—e.g., move the abdominal wall without breathing. *Vocal* exercises—The closed-lip affirmative, "m-hm," taken up the scale in half steps, and in the higher register, "make it a pig squeal," or "pretend someone is pinching you," or "teeny-weeny hums so lightly that the person next you can't hear you."

The muscular changes were perceived kinesthetically and actually by feeling the nasal vibrations and the change in position of the "voice box" as it moved up with higher pitch. Individual performances before the group provided the realization that improvement was being made, very striking improvement as revealed by successive recordings.

Manual Verbal Coordinations. The motor skill that is universally taught in school is *handwriting*. Unlike most such skills, performance is a continuing record of movement. It is a kind of time-and-motion study in itself, though the writing is by no means a record of all the movements involved. While its objectives are purely instrumental, since one learns to write that he may communicate, the feeling of need and hence the motivation are fairly uniform, though levels of performance vary widely.

[21] V. A. Brody, *An Experimental Study of the Emergence of the Process Involved in the Production of Song*, unpublished doctoral dissertation, School of Education, University of Michigan, Ann Arbor, 1948.

Most of the experimentation with handwriting has been concerned with the measurement of the *speed* and *quality* of the product at different age levels. Speed is determined by the number of letters written per minute, which ranges from 73 to 105 in the eighth grade in different cities. Quality is measured by comparing any pupil's handwriting with a series of standard graded samples ranging from very poor to perfect. Thorndike, in 1910, developed the first of such scales, giving the different steps a numerical value determined by a large number of judges rating many samples of handwriting for the quality of general merit. The Ayers scale, which appeared somewhat later, has been widely used in the so-called Gettysburg edition, so named because the samples consist of the opening words of Lincoln's great address. In this scale, the speed with which the judges could read the samples was used as an index of their *legibility* (Figure 79).

Formerly, the schools emphasized perfection of handwriting, attained at considerable cost of time and effort which, it is believed nowadays, were not wisely

Figure 79. Curve Showing the Norms for Rate and Quality of Handwriting as Measured by the Ayers Scale. The numbers in the circles represent school grades. (L. P. Ayers, *Measuring Scale for Handwriting*. By permission of the Russell Sage Foundation.)

spent. Figure 80 illustrates the chief reason that lower standards are now accepted. Furthermore, it has been found that the average quality of handwriting as measured by the Ayers scale was 50 or less for a sampling of graduate students, teachers, and social service bureau inquiries. Signatures on bank checks and on a hotel register showed a median of 41. These measures indicate the usual range of the careful and careless writing of adults.

Diagnostic studies of pupil handwriting have been made with a view to discovering the causes of the more common defects of slant, alignment, letter-formation, and spacing. Freeman's chart and Gray's score card are convenient teaching instruments in this connection. Just how the desired excellence is to be obtained is still a disputed question—whether the letters should be formed by movements of the fingers, or by considerable involvement of the forearm, though usage leans to the latter method. Furthermore, the question of the amount of practice

Figure 80. *Two Specimens of Handwriting of the Same Individual.* The first is from a volume of specimens prepared for the Centennial Exposition in 1867, the second in his customary hand in 1919. (S. A. Courtis, "The Nature and Function of Educational Measurements," *Journal of Proceedings of the Music Supervisory National Conference*, March, 1922.)

needed is still open, for some schools do better with less practice than others with more. Clearly, one factor is teaching technique, some of the more important aspects of which are the following:

1. Motivation. Children will want to write if there is need for it, beginning with simple directions and labels. They will want to improve if they can scale their own handwriting and chart their progress.

2. Fatigue. Much time spent in practice is harmful, especially small writing for small children. Until they are ready for the fine, eye-hand coordinations, large writing is better.

3. Exercise. Practice there must be, but intervals are important, norms of speed and quality should be known by the teacher, and the same standard should be demanded of a pupil in all written work.

4. Interval. Short, spaced practice periods are better than long.

5. Maturation. Readiness is determined by the ability and desire of the pupil. Manuscript writing is more easily learned first, because it is more like print, and because the separate letters form simpler perceptual patterns and shorter performance units than when imbedded in the whole word as in cursive writing.

6. Individuation. The forming of letters is affected by the position of the body, which need be no more awkward for left- than for right-handed pupils, and by the total arm and wrist as well as the finger movements. Illegibilities can be corrected by attending to part movements.

Individual differences in handwriting have long attracted attention, especially among those who give credence to the claims of the charlatans that character is revealed in this way. One can, however, distinguish the writing of men and women more often than mere chance would allow. Experiments have shown that such judgments are correct 67 per cent of the time instead of 50 per cent, the expected chance result. Two guesses out of three are right. Just what elusive criteria are employed in such judgments it is difficult to say, but probably no small factor is the better quality of the feminine hand, for here, as in a number of similar skills, the average male performance is slightly inferior.

The development of skill in handwriting involves or may involve ballistic movements. The Spencerian system calls for relaxation of the arm, the forearm resting on its muscle pad, and the rapid-writing movements propelled upward and back without point-by-point control along their course. It also involves matters of posture, the comfortably erect sitting position and general bodily relaxation except for the action of the operating muscle groups.

The same general conditions apply for *shorthand* and all business machine work, the most common of which is, of course, typing. In typing, the movements are clearly of the sort previously described as "arrested by an obstacle or block." But speed is developed, not by pushing the key down and then, when the block is encountered, pulling the finger back up; instead, the two movements are telescoped into the self-limiting type with little pressure on the block. The original quick ballis-

tic thrust curves around at the end, making what is really one movement of the stroke and the return of the finger to be in readiness for the next stroke. The movement is similar for the telegraph key. Motivation and progress in typing and telegraphy have been described earlier.

Typing has been introduced in some elementary schools, where it has been found to contribute to an interest in correct spelling and writing. Seemingly, children can learn to type about as fast as they can write. However, the use of typewriters is usually postponed for high-school commercial courses.

Manual Esthetic Coordinations. The motor skills involved in the graphic arts are presumably similar to those of handwriting. Scientific knowledge is meager in the field of *drawing*, either mechanical or artistic, though the development of intelligence has been found to parallel somewhat closely the improvement in skill shown by the growing child. *Painting* and *modeling* have been a part of the kindergarten-primary curriculum for years, but only as self expressive activities in which little skill was expected. *Finger-painting* provides an opportunity for the practice of free movement in which muscular and perhaps emotional tensions are released and at the same time artistic results are achieved.

Work in applied music is primarily the development of motor skill with sensory, esthetic cues. The term "applied music" refers to singing and to playing musical instruments. Instruction in the past has tended to emphasize the esthetic more than the physiological. The method of imitation ("play it this way") has produced excellent results with the talented, but with others discouragement and, too often, withdrawal from the field. A host of beginners with sufficient ability to be able to play well enough to bring enjoyment to themselves and to others simply give up. The scientific study of auditory difficulties has explained the nature of some failures, and adequate methods of vocal instruction, as has been shown, can produce well-nigh miraculous results. There are no doubt similar possibilities ahead for the strings, brass, and woodwinds. While the latter involve breath and lip coordinations (the so-called embouchure), the playing of string instruments is a manual skill, though piano and harp involve a moderate amount of foot coordination. In terms of complexity of motor involvement, the percussion instruments are the simplest, beginning with the triangle, cymbals, drums, tambourine, and tympani, while the pipe organ is the most complex, with its several manuals, stops, and pedals.

While little scientific work has been carried on in the motor skill of playing musical instruments, it becomes clear that two very important

considerations have been relatively neglected.[22] One is perceptual, which may be referred to as phrasing; the other is motor, involving the ballistic movement.

Phrasing is the breaking-up of a selection into units which are themselves smaller musical patterns. The musical score divides the selection into measures separated by bar lines, and those measures which mark the regularly recurring beats (4/4 time, 3/4 time, etc.) are the patterns that beginners are taught to perceive. It is of course necessary for them to recognize these time patterns, but the phrase is rather a rhythmical pattern that jumps the bar lines, and is played chiefly by variations in time and in dynamics.

For example, the beginner, who is taught to count 1, 2, 3, 4 in 4/4 time, is apt to pause slightly before counting 1, 2, 3, 4, for the next measure. He perceives the measure as a unit. But the *phrase* may properly begin with the count of 4, which should be closely connected with an accented 1. The 4–1 is then the smallest unit in phrasing, and the

pattern would as a rule follow the formula $\overset{\frown}{4}\,\overset{>}{1}$, 2, $\overset{>}{3}$, which would be the next larger unit, with the 1 more heavily accented than the 3. The next four beats would constitute a similar unit and together would constitute a pattern that may be thought of as a question to be followed by the next eight as the answer. Thus the smaller units maintain their integrity while constituting parts of larger musical patterns. Practice that calls for such attention to patterns within patterns presents a continuing challenge to the learner, who soon discovers that even "exercises" can be played so they sound like real music. He learns to see the phrases in the musical score, and to play them in such a way that they may be heard by the listener. Adequate instruction in phrasing is often delayed until many have given up, and advanced students of music do not always get it.

The *ballistic movement* has been shown to apply to those motor skills in which the force is applied at the start and carried through chiefly by momentum. While a degree of control is exercised throughout, the total movement is a complete whole and is not subject to change of direction along its course. It is employed advantageously in the finger work in the more rapid playing of keyed instruments (piano and organ) and in the fingering of woodwinds, of brasses, and of string instruments. In the latter, however, the termination of the movement often calls for a greater degree of continuing pressure against the block, in this case, the fingerboard. It is particularly important in bowing, reducing the

[22] Leo Lemke, *op. cit.*

tensions and permitting the development of better tone. It likewise contributes to the development of phrasing, as, for example, when the beat of 4 is played up-bow, followed by the ballistic turn involving the wrist in preparation for the accented 1 with the down-bow.

Manual Tool Coordinations. While the manual skills of the shop involve some continuing movements, such, for example, as work at a lathe, and some use of esthetic standards as in arts and crafts work, they are primarily unit skills such as hammering, sawing, and the like which are separate steps in a process. Most of the unit skills are relatively simple in themselves, involving careful eye-hand-coordinations. But after a basic level of performance has been attained, the task becomes one of where and what to saw, hammer, and the like, that is, what kinds of materials should be used, where they should be cut, hammered, spliced, planed, sand papered, and so on. Thus shopwork is not so much a series of simple skills that can be performed by the dull normal or feeble-minded, as many suppose, as it is an occasion for applying knowledge and using judgment. Instruction becomes less a matter of coordinating rapid movements, as in the skills previously discussed, and more a matter of an intermittent succession of movements for which the cue and the check list are the important considerations.

The *cue*, here, is the condition of the material on which one is working. When it is smooth, or melting, or cut to proper dimensions, etc., then this or that must be done. The teacher points out and the pupil must learn what these conditions are, and be able to recognize them for himself. The *check list* is a point-by-point record of the successive steps to be taken in the process—when this is done, then you do this, and so on. The check list can serve as the directions for procedure, and as the scale on the basis of which the final product is evaluated. Some processes can be pretty well standardized, but others often call for judgment, particularly when unforeseen events occur, such as the breaking of the tool or of the material being worked. The good shop teacher accustoms the pupil to making such judgments, helping him to discover the criteria on the basis of which they are made. The same principles apply to the use of laboratory instruments such as the compound microscope, where they are particularly important since breakage is costly.

Somatic Coordinations. The motor skills earliest acquired are those of *locomotion*—walking, running, skipping, and the self-propelling of simple vehicles—scooter, tricycle, bicycle, and roller and ice skates. At the earlier stages these activities are so simple that they call for little direct instruction. The human organism, adapted as it is to erect posture,

acquires the locomotor skills through a combination of innate capacity and imitation, so that it would appear that it is all a process of development. This interpretation may be accepted if "development" includes self-teaching, trial-and-error, encouragement, and, particularly in the vehicular movement, no little amateur instruction. The encouragement is needed in the new, uncertain experience of rapid, unexpected movements produced by wheels, and by ice, movements which make unexpected demands on the static and kinesthetic senses in order to maintain body balance and orientation. The inadequacy of previously acquired coordinations results in frustration which may produce fear and withdrawal responses, as similar difficulties often do for beginning swimmers whose fear of the water is their chief difficulty. In cases like these, a job of emotional conditioning must be done before any real progress can be made in acquiring the skill as such. The locomotor skill of children as a rule is not highly developed, but as they grow older they may wish to improve.

Difficulties of a different sort appear as the vehicles get more complex. Sailing requires practice in coordination (handling the sheet and tiller) under varying conditions of balance, and learning to respond quickly to static as well as kinesthetic cues produced by the vagaries of the wind. Learning to drive an automobile has come into the curriculum of some schools in an enlarged safety program, a motor skill which improves with greater rapidity in some learners than the judgment needed to employ it. The associative, "what to do when" kind of instruction needed in shop skills is appropriate here, though, since the machine is carrying the operator along with it, the cues may be quite unexpected, such as a sudden curve or another car on the wrong side of the road. The comfortable driver's seat produces an illusion of safety the influence of which some find it difficult to overcome. Instruction in driving, like instruction in swimming, often needs to include attention to the development of attitudes.

Speed and Body Orientation. Races over various distances call for speed and stamina in varying amounts, and these require practice and coaching on some of the finer points, such as the start, when to use bursts of speed, and how to persist in spite of discomfort. Likewise, in most group games, like baseball, football, and basketball, running is an important fundamental skill, often complicated by the position of the ball and other players. In variations, such as the hurdles, speed and figure skating, hockey and skiing, other details must be practiced, involving further difficulties of body balance and orientation which also multiply

progressively in the broad jump, the high jump, and the pole vault. In these latter events, which must be performed without any slowing down for accuracy, the take-off is about all that can be practiced separately. Any other modifications of form have to be individuated out of the total movement while it is in progress. The same is largely true of performance on the gymnasium rings, tumbling, and diving, all of which require that a control of the body be maintained while the feet are not on the ground.

Swimming is a peculiarly complex coordination which many of the lower animals do not have to learn, but which for man is relatively difficult to acquire. From the point of view of learning, it has especial interest since it involves considerable emotional content (at first), new bodily orientation, and continuing overall bodily involvement. And yet, while its speed is relatively slow, and although it is a single recurring coordination pattern, it is difficult to observe and photograph.

Some of the problems that face those who are called on to teach others to swim are listed below, with tentative answers:

How may initial fear, if it is present, be overcome? By a group situation, by having the water neither too cold nor deep, by permitting the use of rubber tubes, by not forcing, scaring, punishing or scolding, but, instead, by developing a climate of confidence, interest, fun, and enthusiasm.

How can one predict who will learn the most quickly? Those who can exert the most pull while held up by a rubber tube.

How can beginners be taught to relax?[23] There is no good answer to this. It cannot be done merely by telling them to or by practicing relaxation on land. There are tricks which sometimes work, e.g., overcoming fear and developing confidence in the water, teaching them to float, and having them keep their eyes open under water.

How can the stroke be improved?[24] The process seems to be one of individuation, that is, making the improvements during the process of making the movements. However, separate parts may be practiced separately (kick, arm stroke, breathing) and then integrated into the total swimming coordination. However, as has been noted, the directions that are shouted at beginners prove at times to be false cues, frequently resulting in worse rather than better performance.

The Individual Opponent. In the somatic coordinations thus far discussed, it is necessary to deal primarily with the natural environment—

[23] H. W. Copp, *op. cit.*, n. 16.
[24] R. H. Hagelin, *op. cit.*, n. 17.

the ground, the air, and water. The learner must be adjusted to these more adequately if performance is to improve. Another group of sports call for the overcoming of an opponent or antagonist: fencing, boxing, and wrestling. Also, in certain group games, such as basketball and football, players are matched against each other, under differing sets of rules. In all of these, certain coordinations—strokes, feints, jabs, holds, and so on—can be taught and practiced separately at reduced speed, but the skill develops as they become more automatized and are called out by the observed movements of the opponent, which serve as cues. The task of the learner is (1) to develop his strength and general physical condition, (2) to acquire the coordinated movements, (3) to learn to perceive the movements of the opponent as visual cues, and (4) to learn to respond quickly with the correct movements of defense or offense.

The Projectile. A number of sports call for the hurling of a projectile as great a distance or with as much accuracy as possible. Among these are the shot put, the hammer throw, the javelin and discus throw, and bowling, and in group games, pitching or throwing a baseball, passing and shooting in basketball, passing, punting and drop kicking in football. Probably, marksmanship with rifle, pistol, and bow and arrow should also be included. In most of these, the contestant can take his time, speed is purely incidental, since distance or accuracy is the objective, but timing of the coordination is fundamental. These skills definitely need to be taught in order to avoid wrong coordinations and to help the learner to take advantage of the momentum developed, or of other characteristics of the sport, such as the stance, and steps to be taken. With the exception of the marksmanship events, the learner is himself a ballistic instrument, and his objective is gradually to develop the needed force before "expelling" the projectile, and at the same time to give it the proper direction. His follow-through is terminated only by the ligaments or passive muscles, since there is no block to stop it and no reverse movement calling for the play of the antagonistic muscles. These coordinations, owing to their relative simplicity, intrigue the investigator, who, however, is apt to be baffled in studying them since, after they are performed with a moderate amount of skill, improvement comes slowly and irregularly and is dependent on very fine muscular coordinations. For example, the difference between success and failure of a free throw in basketball may be less than an inch at fifteen feet, and dependent on an indeterminate amount of pressure on the ball exerted through the action of knees, shoulders, arms, and fingers.

Marksmanship presents an unusual problem in sport since it depends in large measure on no movement, that is, on fixation, in which opposing muscles are contracted against each other in the task of holding still. Successful marksmen may be able to hold still better than others, or they may pull the trigger (or release the arrow) as the sights move past the target.

Batting a Target. The phrase "batting a target," which has a most unsportsmanlike sound, is employed to include a component of a number of different athletic games. We could say hitting a target, but this would include the marksmanship skills, or hitting a ball, which would be all right for baseball, lawn or table tennis, squash, handball, and golf, but not for badminton or hockey, in which the target is not a ball, but a shuttle-cock (bird) or a puck. In these games, the basic skill required is to bat a target that in practically all cases, except for example in golf, croquet, and facing off in hockey, is in motion, sometimes very rapid motion.

However, the muscular coordinations required for batting have a number of basic elements in common, whatever the game. First, there is the position or stance in relation to the target. This is much simpler when the latter is not in motion, as in golf, or when its motion is controlled as in the serve in tennis, but is quite as important with the moving target, the course and position of which must be judged very quickly, as in any of the other strokes in tennis. Second is the grip on the bat, stick, or racquet, which may have to be shifted quickly as from forehand to back-hand. Third, but overlapping these in time, is the perception of the position of the other players, of the target moving through space, and of its direction and speed, and timing the stroke accordingly. Fourth is the stroke itself; and fifth, a part of the same coordination, the perception of the situation so that the target may be hit in the right direction. Some of these, like the stance, grip, and stroke, can be practiced separately, but they are not quite the same as when they are parts of the total play, so they must be individuated and made subject to control as on-going parts by the process of progressive approximation to the correct motor coordination.

Team Orientation. In the projectile sports, it makes no difference where other participants are, so long as they are not in the line of fire! In those in which there are individual opponents, the movements made by the latter in large measure determine the nature and sequence of responses to be made. In team games the perceptual task is equally important and more complex since it is necessary to know where the other players are. In baseball, the positions are fairly stabilized. But in such

games as tennis, hockey, basketball, and soccer there is greater fluidity of movement, and the task for the beginner is therefore one in which he needs definite instruction. Such instruction in soccer, for example, includes directions for each player in each position as to where he is expected to go and where not to go when the ball is in one position or another, in possession of his team or of the opponents, and so on. Thus each player learns not only where he should be, but approximately where his teammates should be under various conditions, and, knowing this, he can attend more directly to the ball and the members of the opposing team.

While team orientation is not in itself a motor skill, it is a functional part of the learning required, which, if not mastered, renders impotent the specific skills of running, throwing, hitting, and the rest. And it also involves one of the fundamental "lessons" to be learned from team games, that of responsibility for an assignment, even a minor one, which contributes to the values sought by the group as a whole.

In Summary

The process of transforming motor coordinations into a skilled performance satisfies a number of physiological and psychological needs, but both instruction and practice are necessary. The differences among learners to which individual adaptation must be made in teaching include the stage of physiological development, the amount of previous experience and practice in the skill, body type, interest, and ability, including intelligence, special talent, and the work methods that may have been earlier employed.

Perceptual-motor learning takes place through the process of progressive approximations. Incentives to continuing practice are to be found in a time-and-place habit, social approbation, and a chart of progress with due attention to spaced practice periods to avoid the fatigue factor. Learning (time or work) curves of unit skills measured in the laboratory reveal initial rapid progress with minor fluctuations and usually with plateaus, followed by a slowing-down as the limit of improvement is approached.

In perfecting a coordination many "wrong" responses (multiple response) are made to the stimulus situation due in part to its various aspects to which different responses are made. To reduce the number of these, a correct set or physical readiness is necessary. Of utmost importance is the ability to perceive the significant stimulus or combination of stimuli to which the motor response should be made. The desired movements may be of different kinds (fixation, slow, fast) and are

stopped in different ways. The exploration of the ballistic movement suggests that it not only describes the course of many skilled, fast coordinations but also indicates an important approach to problems of relaxation, speed, and accuracy The desired approximations are attained both by individuating them from the mass of activities taking place and by integrating unit skills into the on-going activity.

The teacher or coach is responsible for providing the verbal or visual stimuli or cues for the responses desired, but these have to be taken over by the learner, many of them becoming kinesthetic and many of them remaining in the environmental situation as signs (conditioned stimuli) indicating when the acquired coordinations are to be made, or as criteria for judgments of procedure. Throughout the process of learning, previous experience serves both as a facilitating and as an interfering or inhibiting agent, and continued practice is necessary if the more complex skills are to be retained at a high level of proficiency.

The importance of effective instruction in certain aspects of the perceptual-motor skills is recognized in eye-movement coordinations in reading, in speech, in the pronunciation of native and foreign languages, in manual skills such as handwriting, typewriting, drawing, painting, and playing musical instruments, in shop and laboratory skills in the techniques of manipulating tools, machines, and scientific instruments, and in the great number of athletic events and activities.

Questions

1. What motor skills have you acquired? Can you determine why these were selected and, if you failed to continue in any, why you dropped out?
2. Cite instances of beginning a skill too early; too late; of forcing children to try to acquire a skill without proper regard for individual differences.
3. What conditions are largely responsible for children's not wanting to practice?
4. Taking some skill as an example, indicate some of the wrong work methods that are likely to be adopted and practiced by a learner who does not have the advantage of instruction.
5. Plot your improvement in mirror drawing. (What apparatus is necessary for this?) How closely does it conform to the usual learning curve? How do you explain your errors? How might instruction have helped? In general, do you consider a person who makes errors foolish if he "knows better"?
6. Procure copies of some cancellation test or, lacking that, take a page of some magazine and cross out all the *e*'s. If all mark the same

passage, a comparison of results is possible. What is the median number of letters crossed out in one minute? The average deviation? Do the girls in the class show the expected superiority?

7. What is the ballistic movement? Show its relation to relaxation. Is it applicable to all skills? Explain.
8. Is it true that a movement made separately is not the same when it is made as a part of a larger coordinated movement? Discuss.
9. Cite examples of learner's cues in some skill with which you are familiar.
10. Does learning transfer from one skill to another? Discuss.
11. How can you improve your speed of reading?
12. What emotional responses need to be taken into account in giving instruction in a motor skill? Indicate what some of the situations are that give rise to them, the typical emotional response, and steps the instructor can take to improve the situation.
13. What do the instructor's words "Right" and "Wrong" mean in the process of instruction in a motor skill?
14. Describe various kinds of mechanical aids to motor learning, indicating their uses and shortcomings.

Readings

Adams, Thurstone. *Motion Pictures in Physical Education*. New York: Bureau of Publications, Teachers College, Columbia University, 1939. Suggested techniques and practices for supplementing instruction by the use of cinematography.

Dvorak, A., N. L. Merrick, W. L. Dealey, and G. C. Ford. *Typewriting Behavior*. New York: American Book, 1936.
"Psychology applied to teaching and learning typewriting."

Garrison, S. C., and K. C. Garrison. *Fundamentals of Psychology in Secondary Education*. New York: Prentice-Hall, 1936.
Chapter XVII, "Psychology of the Practical Arts," deals with learning in home economics, manual arts, telegraphy, typing, and physical education.

Gray, W. H. *Psychology of Elementary School Subjects*. New York: Prentice-Hall, 1938.
Chapter I deals with eye-movements in reading, and Chapter II with handwriting.

Griffin, F. W. W. *The Scientific Basis of Physical Education*. London: Oxford University Press, 1937.

Mitchell, E. D., and B. S. Mason. *The Theory of Play*. New York: Barnes, 1934.
See especially Chapter V on a classification of movements, and Chapter XVIII on athletics in high schools and colleges.

Neilson, N. P., and F. W. Cozens. *Achievement Scales in Physical Education Activities*, 1934; *for Boys and Girls in Elementary and Junior High Schools*, 1935; and Cozens, Trieb, and Neilson, *Physical Education Achievement Scales*, 1936. New York: A. S. Barnes.

Directions for scoring various gymnasium, track, and field events for different levels of athletic prowess.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology*. New York: Harper, 1937.

In Chapter VIII is reported Bryan and Harter's pioneer study in learning the telegraphic language.

Reed, H. B. *Psychology and Teaching of Secondary School Subjects*. New York: Prentice-Hall, 1939.

Chapters 12 and 13 discuss the learning of typewriting.

Skinner, C. E. (Ed.) *Readings in Educational Psychology*. New York: Farrar and Rinehart, 1937.

Chapter VII contains selections relating to the acquisition of motor skills, including No. 2, "More Complex Motor Skills," from Bryan and Harter's pioneer study.

Skinner, C. E. (Ed.) *Readings in Psychology*. New York: Farrar and Rinehart, 1935.

On pages 575–576 the ophthalmic telebinocular is described.

Starch, D., H. M. Stanton, and W. Koerth. *Psychology in Education*. New York: Appleton-Century, 1941.

Chapter 17, "Vocational Explorations," and Chapter 18, "Health and Physical Education," have sections dealing with certain aspects of motor learning.

Esthetic Learning— Appreciation and Creativity

Art in the Curriculum. The opportunities for acquiring skill in the arts through the regular school curriculum have been multiplying rapidly during the last few years. Not only have the fine arts—music, literature, painting, sculpture, and architecture—been receiving more attention, but also programs in the household arts and handicrafts have been greatly enriched. The current development follows a long period of neglect, and in many schools, even today, no such program exists, or it is meager and formal, or consigned to hours before and after the regular school day. The reasons for this neglect are to be found in the nature of the development of American culture.

The early conditions of settlement in this country did not attract those of an artistic turn of mind or encourage the leisure activities practiced in a mature and well-established civilization. The frontier life was hard; moreover, many who came, particularly in the northern colonies, were religious dissenters who associated art with the churches from which they had fled. The tradition continued as the frontier moved westward and as a decidedly utilitarian civilization developed. Additions to the curriculum of the "three R's" were either in the scholarly and classical tradition that prepared for the ministry or in the scientific and "practical" pursuits that would contribute to making a living and making money.

Another reason for the neglect of esthetic values in school curricula is to be found in the formal type of educational theory and practice that was imported into this country following the stage of general neglect of public education in the colonial and early national periods. The teachings of Pestalozzi, Herbart, and Froebel became formalized,

631

and all subjects had the atmosphere of compulsion about them, derived in large measure from Prussian practices. The one subject that had esthetic possibilities was English literature, and it was as formal as the rest. When music, painting, and clay-modeling were introduced, the tradition of prepared lesson outlines continued, and pupils were punished in one way or another if they did not do what the teacher told them. Even if there had been a public demand, the schools were hardly equipped to offer an art program worthy of the name.

As the classical traditions in art began to lose their potency, and as imitativeness gave way to creativeness, a new awakening took place. No longer did painters need to flee the "American desert" and club together in the left-bank studios in Paris; no longer was it necessary for a singer to gain a European reputation before appearing on the stage of the Metropolitan Opera House. Symphony orchestras and art galleries grew more numerous. The culture was changing. As yet, however, the school program in the esthetic field is inchoate, and lacking in any central purpose and meaning. Relationships with other subjects have not been worked out. Methods of instruction and measures of improvement are in the process of being developed, and the nature of appreciation and of creativity is beginning to be translated from the vague, effusive abstractions of the esthetes into language that can be understood and that can be used to formulate an educational program. Meanwhile, those who are moved primarily by esthetic values often look in vain for guidance since they do not realize what it is they need, and most of their teachers are quite ignorant of what art can mean as a way of life.

1. Psychological Aspects of Esthetic Experience

Affectivity. Many psychological components go to make up artistic appreciation. They are found in varying combinations in one who is stimulated by things or patterns of things that are called beautiful. Esthetics is the name given to the systematized knowledge of relationships which are judged according to the norm of beauty, just as in the sciences the norm is agreement or truth, and in ethics, rightness or goodness. Scientific explorations have been made to discover what kinds of sensory and perceptual patterns are so judged by people who differ in age, training, cultural background, and so on, and to find out the ways in which preferences change, and how individuals may be guided most effectively to develop their appreciation of conventional art forms and their creative talents.

The basic psychological component of esthetic experience is positive

affectivity or pleasantness. Many experiments have been performed on color and tone preferences. Blues and greens seem to be preferred in experimental series over orange and yellow, but there is so much divergence that no definite conclusions can be drawn. Other factors are important in actual situations: *chroma*, or degree of saturation—whether it is a "rich" color or presents a "washed out" appearance; *gray value*, or the shading or tinting; *mixtures* with other colors; the appropriateness of the color to the object; and the harmonizing or contrasting of colors in the environment. The attempt to discover the most pleasing tones has met with similarly little success. Here, except for very loud sounds, the tones which are sounded simultaneously or successively determine the pleasantness. Notes which are off in pitch are unpleasant, and there is some difference in the intervals which different people prefer. The latter is apparently a matter of custom. The early church music was sung in unison in octaves, other intervals being considered harsh. When a new interval was introduced, as, for example, the major third (do-mi), it seemed to pass through various stages of acceptance: felt to be a dissonance; permitted occasionally; thought of as a new and fresh consonance; permitted in a final chord; considered hackneyed; used to reinforce a single tone. Some of the chords employed in so-called modern music are still in the first stage, while some of the chords used by Wagner and objected to in his day have reached the second or third stage of acceptance, or beyond.

The earliest scientific efforts to find the elementary characteristics of esthetic preference were made by Fechner in his experiments on the "golden section." According to the Greek geometers, the division of a single line was most pleasing if the whole line is to the larger segment as the larger segment is to the smaller—the extreme and mean ratio. A line 4 inches long divided into segments of 2.47 and 1.53 inches represents this ratio approximately, the quotient or ratio in each case being 1.617 + (Figure 81). After a long series of experiments with different geometrical forms, Fechner found that, although there was such a wide diversity of choice that the golden section could not be said to represent a fundamental law, the central tendencies for the different subjects he used, artistic and otherwise, did approximate this ratio.

The field of literature affords abundant examples of esthetic preference among sounds ranging from euphonious to cacophonous. The difference between "sliding down a cellar door" and "which chanced first to bump" can easily be detected by the most unpoetic ear, the meaning in each case being negligible. *Rhyming* and *rhythm* tend to make for more melodious utterance, as do *alliteration* and *assonance*, which latter
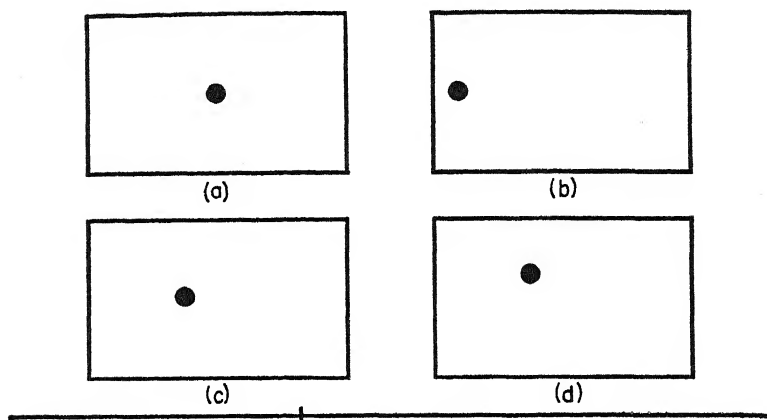
Figure 81. Extreme Ratio and Mean—the "Golden Section" The line at the bottom of the figure is divided into segments illustrating extreme and mean ratio, and the sides of the rectangles are drawn in the same proportion. The dots are placed as follows: (*a*) in the center; (*b*) center left; (*c*) center vertically and extreme and mean ratio horizontally; (*d*) extreme and mean ratio horizontally and vertically.

were employed almost to excess by Poe and Swinburne. The following passage is illustrative:

> In a coign of the cliff between lowland and highland,
>   At the sea-down's edge between windward and lea,
> Wall'd round with rocks as an inland island
>   The ghost of a garden fronts the sea.
>
> In an inning that seemed almost hopeless to weather,
>   The pitcher attained to his ultimate skill;
> Battered with epithets hostile, together
>   With stones and pop bottles thrown to kill.[1]

In the first four lines there is an alliterative repetition of the *k* and *l* sounds, and of the assonant *o*'s and *i*'s. These lines are from Swinburne, while the last four, which are anonymous, continue the same meter but illustrate, as the reader probably noticed, a lower plane of poetic euphony.

A mathematical theory of esthetics selects as most significant the feeling of pleasure or esthetic measure (M) in relation to complexity

[1] Quoted by A. R. Chandler, *Beauty and Human Nature: Elements of Psychological Aesthetics,* New York: Appleton, 1934, pp. 238, 272.

(C) and order (O).[2] Complexity involves effort to perceive and adjust to the object, repeated tensions, and, in verse, an excess of consonants. Order is a realization that the object embodies a certain harmony and, in verse, ease of pronunciation, pleasing assonances, and musical vowel sounds. The formula $M = O/C$, permits a totaling of the elements in verse for O and C; the greater the O in relation to the C, the more musical is the passage. The ratio was .78 for the following lines from Coleridge's "Kubla Khan":

> In Xanadu did Kubla Khan
>   A stately pleasure dome decree
> Where Alf, the sacred river, ran
>   Through caverns measureless to man
> Down to a sunless sea.

It was .70 for the first two lines of the nursery rhyme, "Little Boy Blue," and but .36 for the following quatrain from E. A. Guest:

> He never had much to give,
>   Subscription lists knew not his name,
> He was one of the many who live
>   Unrecorded in charity's fame.

Mechanically perfect rhythm, however, is as unsatisfactory, poetically, as that which is too irregular. Compare, for example, the following three lines:

> "The stag at eve had drunk his fill."

> 'Tis kind of you to permit me to come in.

> "Bright Star, would I were steadfast as thou art."

The first illustrates too regular rhythm, the second too irregular, the third, from a sonnet of Keats, the intermediate that is more pleasing than mechanical regularity.

Sensitivity and Discrimination. Esthetic appreciation, as well as creative talent, involves a heightened sensitivity to stimulation and also an awareness of hedonic factors. To appreciate or to create, one must perceive objects as they are sensed, however they are portrayed. The surface

[2] Birkhoff, G. D., "A Mathematical Theory of Aesthetics and Its Application to Poetry and Music," *The Rice Institute Pamphlet*, vol. 19 (July, 1932), 189–342.

of a "round" table is not round but oval from most points of observation. A "small" object in the foreground is larger than one of greater dimension in the background. A "white" desk blotter is probably yellow where the sun falls on it, lavender in the shadow, and green beside the green book lying on it. One will learn to see objects in their true perspective, to see reflections, color contrasts, and mixtures. He will learn to hear the separate notes of chords, and the timbre of the several instruments in an ensemble, and will discriminate small differences of intensity and time. If he is blind or deaf to such sensory variations, he may still be successful in business, and even enjoy an art exhibit or a concert now and then; but his appreciation is on an elementary level.

A person with even approximately normal vision may find satisfaction in color arrangements unless he is color-blind. One art teacher was persuaded to give the Ishihara test to his class and was somewhat surprised to discover that he had been trying to teach color harmony and contrast to two pupils who were completely color-blind for red and green, and were defective for blue and yellow. He reported that in spite of his best efforts these pupils had brought in the most excruciating color combinations all the year. Likewise, a former manual arts teacher reports that he was never able to acquire the ability to temper metals properly when, as is often the case, the color of the metal gives the cue. He found out long afterwards that his color vision was seriously defective.

It is normally possible to distinguish about 150 hues ranging from red to purple, about 200 shades from black to white, and about 20 degrees of saturation or chroma. Similarly, it is possible to discriminate more than a thousand graduations of pitch from the highest audible notes of 20,000 to 25,000 vibrations (more than six octaves above middle C) down to the lowest audible tone of 16 vibrations (four octaves below middle C), though only about one hundred are used in music. The range of the pipe organ is nine octaves, of the piano a little over seven octaves, and of the human voice about two. The voice and some musical instruments, especially the strings, can produce tones that the piano and other tempered instruments cannot, however, differentiating, for example, between C♯ and D♭. The *vibrato* is most pleasing when the oscillations of pitch approximate a quarter to a half step at the rate of six or seven per second. The oscillations may be produced by changes in intensity, as is done on the pipe organ, but when the rate is reduced the *tremolo* resulting is usually less pleasing. The Seashore tests of musical talent, by the use of phonograph records that present tonal elements exhibiting small but varying differences, test various levels of discrimination in pitch, loudness, timbre, rhythm, and melodic change. While excellence on these tests

is no guarantee of musical talent, a low score is evidence of lack of it, even though the score can undoubtedly be raised by training.

Perception. Sensory discrimination merges into the perception of figures or patterns, the difference lying in the complexity of the stimulus. One might discriminate two pure tones that differ only slightly in pitch, or he might distinguish a march from a waltz. Many army recruits and beginners in dancing classes are not able to do this. They cannot abstract from the tune, the chords, and the rest of the sensations just those parts
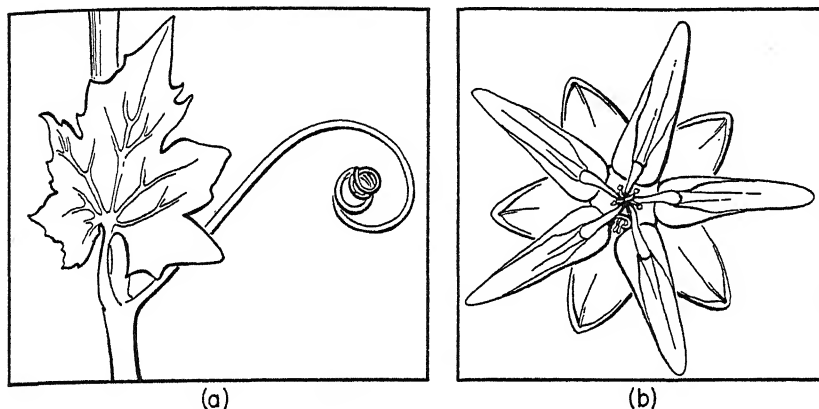
Figure 82.   *Art Forms in Nature* (*a*) White bryony, leaf and tendril; (*b*) Milkweed flower. (From K. Blossfeldt, *Art Forms in Nature*, New York: Weyhe (no date), pp. 45, 61.)

that have to be perceived if the pattern is recognized. In the manifold complexities of the various arts, as well as in the beauties of nature, there are patterns which the beginner cannot at once discern, and which must be pointed out to him. They are not the usual patterns that have only utility value—not just the chair, but the chair in relation to the room and the rest of the furniture; not just the hat, but the hat in harmony with the size, contours, and coloring of the wearer. The skillful art teacher can help pupils to attain a finer appreciation of the materials of his art. He can point out a particularly harmonious arrangement of color and mass, the exquisite flow of sculptured draperies, the melodic line of the woodwinds in an orchestra, or a delicate design in graphical or architectural composition. And he may also turn the pupils' attention to the lovely patterns in nature (Figure 82) that might otherwise go unnoticed —often the sources of inspiration to the greatest artists.

Teachers of different subjects, too, can point out to pupils the esthetic patterns of nature and of art. On field trips in botany and geography they need not confine all their attention to the scientific aspects of their data. Form, in physical education, is an esthetic concept, and many of the great classical works of sculpture represent athletes. Courses in literature can be appreciative as well as scholarly, and in history the cultural development of different peoples can be given more attention—their folk songs sung or played on the phonograph, and colored slides shown of their buildings, their sculpture, and their paintings.

Esthetic patterns may be classified as representative (mimetic), associative, and autonomous, and these vary in significance in the different arts and, differently, for different people. Painting and sculpture are essentially *representative*. A picture is usually a picture of something, and the beginner usually judges it accordingly. If it is supposed to be a picture of a person, a mill, or a mountain, one must be able to recognize it as such, and the artist has certain techniques at his disposal to aid in perception. The space relations and perspective must be right, objects must not be confused or confusing and must not be distorted beyond recognition if one is to appreciate the picture in this way. A statue or a bas-relief may likewise be representative, and the latter must have its well-marked frontal plane behind which all remaining things recede, according to what is known as the "relief law."

Opinions differ as to the extent to which literature and music should be representative. One can use a symphony orchestra to make sounds like a bird or a locomotive, but sound-effects are not music, and representation is not desired. "Word pictures" can be drawn and images suggested, but literature is not very effective in this respect. A half a dozen artists asked to draw a picture of the hero of a novel would differ markedly if they based their portrait on the verbal descriptions furnished by the novelist.

The question asked for representation is, "What is it?" The corresponding question, "What does it make you think of?" brings ideas or *associative* patterns to the fore. Obviously, paintings and statues may suggest such ideas as strength, sorrow, glory, and beatitude, but they can illustrate a story better than they can tell it. Literature, in prose or verse, obviously is the art that is best adapted to the development of ideas and associations. The works of Shakespeare, Milton, and Browning have been "taught" with the purpose of bringing out the patterns of thought and the ideas various passages present. Often the ideas have been too complex to be grasped by the pupils, it is true; nevertheless, the effort was in the right direction. Since the writer of literature deals with par-

ticulars, with the specific deeds of his characters, the reader must do his own grouping to understand what they mean. And beginners need help in perceiving the patterns of meaning.

In the realm of music, one sometimes asks, "What does it make you think of?" Perhaps the program says that it suggests dancing fauns, a fountain in the moonlight, the surge of the sea, or the struggle of the soul against fate. Some music undoubtedly does call up such associations, and some composers have given titles to their compositions that support such an attitude. It is not that the music is made to sound like (that is, represent) any of these things, but it may make one think of them. Of course it might make someone else think of something quite different, so the association should not be forced. Yet at an early stage of development such associations may well add to an individual's enjoyment of music.

The third kind of pattern is the *autonomous*. Instead of asking what the piece represents or what it makes you think of, one asks, "What is the value of the design?" The enjoyment is found within the object itself. From this approach a picture may be enjoyed not for its photographic accuracy, nor for the emotional and associative connotation, but because of the balance of the design, the contrasts of color, and the use of light and shade. Sculpture and architecture can be enjoyed because of the arrangement of lines and masses. Designs in rugs, iron grill work, wall paper, draperies, and clothing can be similarly pleasing—or displeasing. Such a view makes possible the appreciation of "abstractions" in painting and sculpture that mean nothing to the one who asks, "What is it?" For it isn't anything, and it isn't supposed to make him think of anything. It is just an experiment in design that is pleasing and attractive in itself. One finds the same kind of enjoyment in music. The conventional patterns are complex, as are their variations, and the beginner will do well to start with those involving the more obvious rhythms and themes. As he matures in his capacity for appreciation, he can come to discern the greater complexities which the masters of composition have woven into brilliant patterns of phrasing and harmony.

Imagery and Imagination. Since the time of Galton's inquiries into the vividness of mental imagery, the wide individual differences in this respect have been well known. Some people have practically no imagery at all, with the possible exception of a few kinesthetic traces. Others have so-called eidetic imagery that is so vivid as to be scarcely distinguishable from reality.

The play of imagery is often an important part of the enjoyment of

music and poetry. Also, in retrospect, a picture, a sonata, a cathedral, or a landscape, a sculptured bronze, or the lines spoken by a great actor can often be vividly reinstated, affording enjoyment many years after the original experience. One may compare and contrast previous renditions or pictures earlier viewed with those heard or seen later, noting a change of emphasis or tempo, a different kind of brush work, or a new handling of light and shade.

Imagination for the creative artist, however, does more than reproduce former experiences. Michelangelo was apparently able to project his images against the walls and ceilings of the Vatican much as a lantern slide throws pictures on a screen; and then all that was necessary for him to do was to trace them in and fill in the color; or he could see the sculptured figure in the uncut block of marble before chipping away the stone to "set it free." Studies show that as a rule about half the children before the teen age have this vivid eidetic imagery, a frequent reason undoubtedly for the ingenious and fanciful stories they sometimes tell that may be regarded as lies by their elders. But in most cases the imagery fades with the years, so that it is a dubious basis on which to build a course of instruction in art, since the artist would be at a loss for his designs after the disappearance of the imagery on which he had been taught to depend.

Even though the mental imagery of the artist is much like the average for human beings generally, he uses it, nevertheless. In a real sense, he sees how the picture would look if the trees were placed in such and such a relation to the mountain in the background; the composer hears a theme as he wishes to write or play it; the sculptor visualizes his composition in the round; and the architect projects the building in the third dimension, so he can tell, for example, where the stairway will come out on the second floor. In literary creation, imagination has been defined[3] as proceeding "from *whole* to essential *detail* and from essential *detail* to *whole*." The poet gives the essential detail after perceiving the whole. The selection of just the right word or phrase, having just the right connotation gives the direction to the reader, who can then by a process of closure round out the total pattern or gestalt. What the passage means then is a twofold thing. The words denote the subject portrayed, but they also connote the larger meaning which is not expressed. In prose writing, one would use more words and "say what he means"; but to the poet this is like explaining a joke. Poetry is therefore much more compact than prose utterance. The beautiful has been defined as "that which gives

[3] C. P. Smith, *Patterns and Variation in Poetry*, New York: Scribner's, 1932, p. 60.

the greatest number of ideas in the shortest space of time." While this is a rather one-sided and utilitarian definition, and while the meaning of idea might be open to question, the definition does emphasize the essential detail from which poetic imagination must take flight.

Emotion and Mood. Objects of art may stimulate one affectively and imaginatively, but they do more. Whether the appreciation is mimetic, associative, or autonomous, if they are appreciated they produce an emotional response, or at least a mood. A mood is an affective experience, more complex than the feeling of pleasantness or unpleasantness, but not so complex or so intense as an emotion. Experimental attempts[4] have been made to study these effects produced by simple stimuli. Subjects have been asked to draw lines which represent various words. The peculiar thing is that practically all subjects have no difficulty in following such instructions. There is a similarity in the results, too, though no real uniformity. Such words as serious, weak, dead, quiet, gentle, sad, and lazy are expressed by big curves or horizontal or downward-sloping lines. Playful, merry, agitating, furious, and hard are generally expressed by small curves or angles or upward sloping lines. The slope in each case is from left to right. Colors, too, have been similarly investigated. The reds are described as exciting and warm, the greens as friendly and cheerful, and the blues as quieting, peaceful, or depressing.

In music, the major scale is supposed to be bright, clear and joyful, and the minor dark, sad, and yearning. However, when rapid melodies are played in the minor and slow ones in a major, many of the judgments of subjects are reversed. It has been pointed out[5] that the Lydian airs, which correspond to those in the major keys, were considered as voluptuous and orgiastic, and by Plato even as expressing sorrow and self-indulgence. On the other hand, the Dorian octave, which may be played on the white notes of the piano beginning with E, and which closely approximates the minor, was thought to express dignity, manliness, self-dependence, and military valor! Such findings lead to the conclusion that mood depends to a large extent on convention and on context, but probably not entirely. Melodies and lines were combined in one experiment, the subjects being asked to match designs with musical selections played on the phonograph (Figure 83). All subjects tended with considerable regularity to match the designs in the same way, though school children deviated more widely than adults.

Empathy. The imaginative and emotional response to the visual arts

[4] A. R. Chandler, *op. cit.*, Chapters IV, VI.
[5] A. R. Chandler, *op. cit.*, Chapter X.
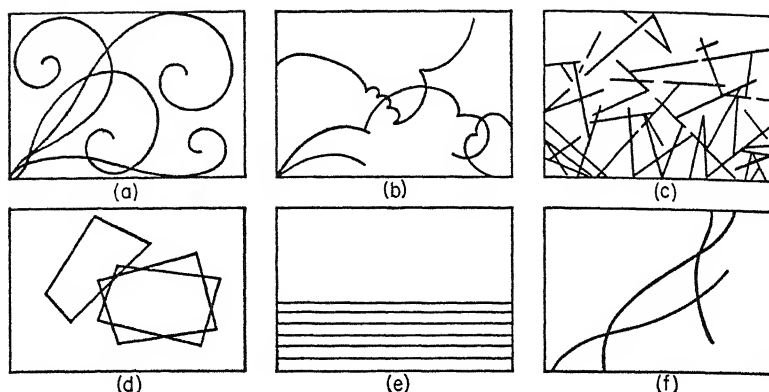
Figure 83. Correspondence of Mood in Music and in Abstract Design These were matched with excerpts from such selections as the following: Grieg's "Butterfly," Chopin's "Funeral March," Grieg's "Morning" from *Peer Gynt*, Handy's "St. Louis Blues," and Tschaikowsky's "March Slav." (Percy O. Danforth, "A Measure of Sensitivity of Children to the Emotional Aspect of Abstract Design," unpublished Master's thesis, University of Michigan, 1940, p. 37.)

is often empathic. The observer tends to imitate the movements of the object portrayed or to participate imaginatively in the situation. The term empathy is a translation of the German *Einfühlung*, which means literally "feeling into." The word *introjection* is used to mean about the same thing, though empathy is usually limited to objects of esthetic interest. It may be illustrated as in Figure 84.

The empathic feeling may be considered as made up primarily of organic sensations and kinesthetic sensations of strain, or it may be a more complete imaginative participation in a picture, play, or story. In the latter case, an individual feels somewhat as he would if he were the figure or the object as in Figure 84 (*b*) or as if he were one of the characters in a plot, imaginatively living through the joys and sorrows of the puppet symbols as if they were his own. The popular appeal of the melodrama, in which the hero and the villain are sharply differentiated, enabling all to rejoice over the final defeat of the latter, is much greater than that of some more pretentious dramas in which there is no one to admire. In these, the audience is baffled, not desiring to be any of the characters; as a consequence many don't like them, and are likely to employ ego-protective devices—to criticize the acting, or to use the cliché about going to the theater to be entertained.

Motion pictures, in spite of the two-dimensional limitation, the radio,

and television, supplementing the auditory representation, have a remarkable capacity to make real the characters and events they portray. And their appeal is to a much wider audience than was ever swayed by the dramas of the legitimate stage. This fact has caused many to wonder whether the vicarious experiences of the world of unreality taken as a steady diet are good for the mental health of the people—particularly of the great numbers of children who average two to three picture shows a week and two or three hours a day listening to the radio. One may surmise that the problem is much the same as that of daydreaming. In moderate doses, little harm can come of it. But a constantly repeated emotional bath, at least if the events portrayed are taken seriously, can but develop a distorted set of values. From the esthetic angle, one could hope that continued dependence on large doses of strong emotional medicine would not be necessary, and that the schools, while commending what is good art on radio and motion picture programs, could gradually build up a demand for something better at least than the general run of films and serials.

The empathic effect has found its way into figurative language, and into common speech as well. One may read that the mountain rises majestically from the plain below, that the stream winds its tortuous way along, or that the trees strain in the wind. Such anthropomorphic language may rouse similar feelings in the reader, or it may merely serve to convey a meaning by ascribing human characteristics to inanimate objects.

(a)   (b)
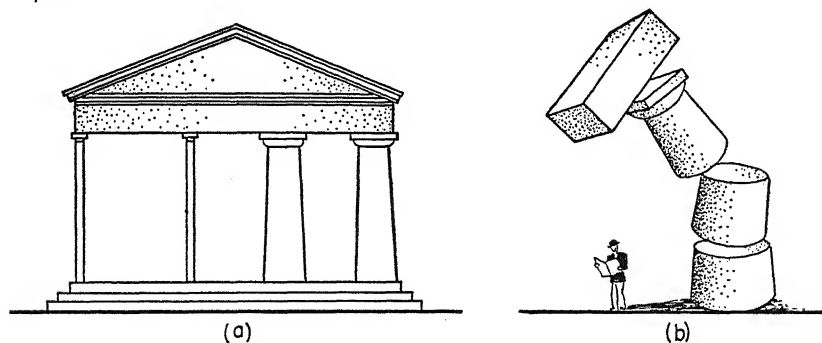
Figure 84.   Empathy (*a*) If the right side is covered, the inadequacy of the left columns to support the massive weight above create a feeling of positive discomfort, while the solid columns at the right (if the left part is covered) give a feeling of adequacy and repose. (*b*) The observer tends to cringe as he identifies himself with the human figure; but, if the latter is covered, the empathic feeling shifts to the falling column, giving one a feeling of disequilibrium.

Creative work supposedly provides the artist with the opportunity to express himself, as the phrase is. This would mean that the finished product in some way represents the producer. The self-portrait is a representation of his appearance, but he may identify himself with other esthetic forms he has created. Teachers of finger-painting have found that children sometimes represent their own conflicts objectively. One child drew a picture to which she gave the title, "Three Men in a Boat before They Were Drowned."[6] There was a large hole in the boat, so the future for them was by no means uncertain. Since the three men appeared in other pictures in similarly dangerous situations, the matter was inquired into, and it was found that the child employed this scheme to get back at her pestiferous older brothers. Jung reported the case of a woman who came to him for help in resolving her inner conflicts.

[On the day before her arrival] a mental image suddenly appeared to her. She saw the lower part of her body thrust into the earth, or rather, among boulders. In the background of her mental picture is the sea. . . . She calls to me to help her; I touch the rock in which she is caught with my magic wand; it breaks apart and her form emerges. She then had the feeling that she should paint this phantasy, and did so. . . . She said that the figure represented herself—that she needed to be set free; and her phantasy had anticipated this statement.[7]

An eight-year-old, emotionally maladjusted child persisted in drawing pictures of speeding automobiles and airplanes concerning which he later exclaimed, "Why, those were me!" Artistic productions can have considerable diagnostic value if rightly interpreted. But their creation can also serve as a release of inhibitions and of tensions that can find no other acceptable outlet. It is doubtful that such release has any great value where there is any real disintegration. It may have. But for many of those who are fairly normal the satisfactions derived from the imaginative introjective process are real, and the demand for such experiences, particularly on the appreciative level, are so great as to suggest the existence of a vital human need. For most creative artists, however, there is no more reason to suppose that they identify themselves with their products than to assume that a mathematician feels that he is the formula he has derived, or that the gardener imaginatively identifies himself with the roses in his garden.

[6] R. F. Shaw, *Finger Painting: A Perfect Medium of Self-Expression*, Boston: Little, Brown, 1934.
[7] C. G. Jung, *The Integration of the Personality*, New York: Farrar and Rinehart, 1939, p. 33.

Knowledge and Thought. While the arousal of associations plays a less significant part in the enjoyment of music than in literature, for example, knowledge about a work, the period in which it was written, the life of its creator, and the nature of his other artistic productions does provide a background for appreciation that should not be neglected. Some of the program notes for popular symphony concerts undoubtedly go farther than one is justified in going in trying to interpret what the composer had in mind. And yet it is interesting to know that the work was written when the composer was twenty-two, or that he was an organist, or was being sued for debt, that the composition was found long after his death in the bottom of a cupboard, or that it was hissed when first played.

Another kind of knowledge about art is that possessed by the connoisseur or collector who values autographed first editions, and, if he is wealthy, assembles original works of the great masters in his private collection. Such an interest is more commercial than esthetic and may go to extremes, though collecting of recordings, prints, etchings, or first editions is an interesting hobby and an enjoyable supplement to other forms of appreciation.

Knowledge about works of art likewise enables one to analyze the manner in which a composition has been esthetically organized and to form a judgment as to its relative merit. Such knowledge includes a familiarity with the development of the art, with its techniques and means of expression. A person who has tried to play a violin or paint a picture or model a statue can, as a rule, find more to enjoy in the consummate craftsmanship of the great artists than one who just goes to look or listen. And this applies not only to the skill in wielding the instruments but also to the structure and conventions of the medium itself. One who knows even a little elementary harmony and musical theory can better appreciate the way the themes and successions of chords are built up.

There is here both a danger and an opportunity. What to the beginner is a beautiful song may to the musician be only a simple little melody in thirds and sixths. The naïve enjoyment is lost; but there are always further opportunities ahead. It would be a mistake for the teacher to deprecate the former before the pupil's musical experience enables him to enjoy the latter. Usually, if there is not too much pressure to move to the more complex forms at a too rapid rate, the elementary and banal, having served their purpose at the beginning, will drop out of their own accord. Art criticism is perhaps as intellectual a process as collecting is commercial. But the patterns with which it deals are esthetic; and a

fuller appreciation of the nature of artistic creation, the difficulties it involves, and the ways in which artists have surmounted those difficulties can provide rich enjoyment.

It is sometimes said that a musical composition or a statue or a building expresses an *idea*. Supposedly, the artist through his medium is "saying something." If the medium is literature, the idea can be understood by those who know the language. It may be just an interesting idea that one may contemplate joyfully, like the coming of spring, or pensively, like the ravages of time. It may be an idea requiring clarification and expository elaboration, in the style of Milton or of Browning. It may be persuasive, seeking to win over the reader to the view of the writer, but it cannot exhort him. It may be moral, but it cannot be moralistic and didactic. Art cannot enforce a moral lesson or it is no longer art. It has crossed the border from esthetics to ethics and pedagogy.

However, the "idea" may not be an idea at all, but an organic unity of structure and design, autonomously apprehended and enjoyed because of its ingenuity and perfection. It is in this sense that the term "idea" is often applied to the nonverbal arts, and especially to music.

2. THE PERCEPTION OF ESTHETIC STRUCTURE

Order. Any work of art, no matter what the medium may be, must have some kind of structural design or pattern. The structure is of course complex, involving many interrelated subsidiary patterns which, like the whole, may be perceived by one who has learned to perceive them and may be judged comparatively. The criterion for such judgments is one of preference: "I like," or "I prefer." But certain kinds of patterns in the various arts, it is generally agreed, are good or bad. Such agreements may be classified under various generalizations that constitute the principles of esthetics, some of which will be discussed in this section.

Perhaps the most basic principle is that of order. Order is, of course, not necessarily esthetic. The plan of interrelated parts may be as utilitarian as a monkey-wrench or a catalogue, or as intellectual as a chemical formula; but nothing can be considered artistic in which some order is not perceived. Many conditions contribute to it, such as proportion, balance, rhythm, emphasis, texture, and unity.

Proportion. Certain characteristics of size and the interrelation of parts to each other enhance the esthetic appeal of an object. In general, relatively small objects, particularly if they are fragile or delicate or present the appearance of immaturity or helplessness, are preferred to huge objects. Acceptable size, however, depends upon what one is accustomed

to in nature and art, and upon their relation to other objects of the same kind. A smile would not be beautiful on a face too small—or too large—for it. However, large objects may be beautiful if reduced by perspective—a mountain, for instance—or if only parts are presented revealing interesting detail. These same conditions hold for buildings, statues, pictures, poems, and music. Simplicity of theme and pattern is generally preferred to excessive decoration. The succession of notes of the major scale reverberate through the greatest music, and simple geometrical forms may be discerned in the planes of the finest painting and sculpture. But "fine writing" is an epithet more opprobrious than complimentary. One of the evidences of skill in the creation of an object of art is to develop the detail without clutter and confusion. Modifications are added by varying a central theme. In music there are a number of ways in which this is accomplished—by repeating in a different key or mode, by inverting (going down where the original theme went up, and vice versa), by playing more slowly or rapidly, changing the rhythm, adding extra notes, and changing the intervals, and harmony. In the other arts, the repetition of angles or colors in different parts of the picture or building, or of the same plot among the minor characters, is a scheme of pattern and variation, and this and many more are employed to maintain the proper proportion and relationship of parts.

Balance. One of the most important principles of esthetic arrangement is balance, which may be obtained in many ways. Bilateral, symmetrical, or axial balance, in which the right and left halves are equal produces a formality that as a rule is not highly appreciated in our present culture. A rectangle, a see-saw, candlesticks on either side of a clock, and a central door with a window on either side illustrate bilateral balance, as in Figure 85 (*a*) and (*b*), while (*c*) illustrates bilateral balance without symmetry.

Informal, asymmetrical, or occult balance is felt empathically. It may be obtained on the see-saw principle by pushing the smaller object farther from the center; but this may not be effective. Rather, there must be a kind of center of gravity for one's interest, a balance not of objects but of impulses, creating "esthetic repose."[8]

The smaller object, by its contrasting mass, or color, or intricacy of design, may direct due attention to it. An excellent example of this is to be found in the familiar painting of Puvis de Chavannes, "Saint Genevieve Watching over Paris." Here the figure and a heavy square doorway and roof are on the right, and on the left, a jar of flowers, and

[8] E. D. Puffer, *The Psychology of Beauty,* Boston: Houghton Mifflin, 1905, p. 79.

(a)

(b)   (c)
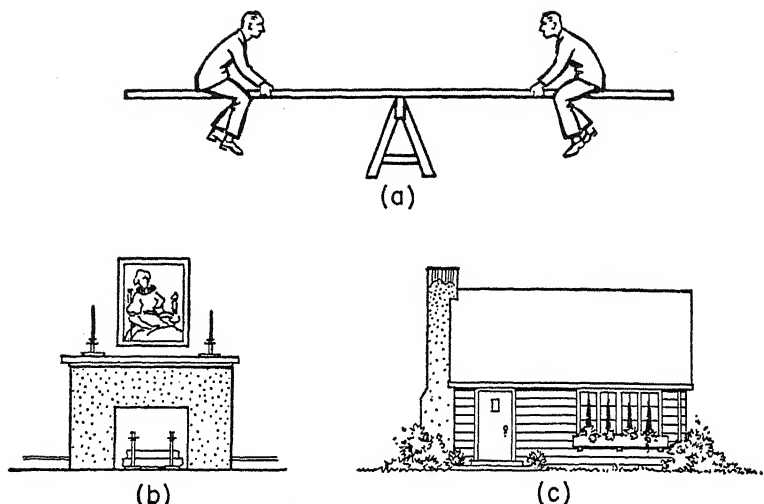
Figure 85.   Bilateral Balance

in the distance roof tops lighted by the moon. The same effect of balance and repose can be illustrated more simply, as in Figure 86, in which, in one case there is nothing whatever in the picture to balance the figure

(a)   (b)
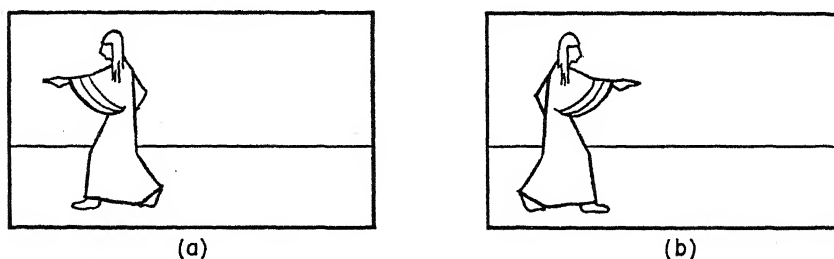
Figure 86.   Balance and Direction of Interest The figure in (*a*) is in the same relative position as in (*b*) while the latter produces a satisfying effect, not on the see-saw principle, but by direction of interest.

except the direction of interest. The same thing may be shown diagrammatically, as in Figure 87.

An experiment to determine whether preschool children were sensitive to compositional balance in three dimensions was made by presenting paired piles of blocks, one pair being balanced and the other not.[9] The children were asked, "Which is nicer?" Though there was considerable

[9] P. C. Daniels, "Discrimination of Compositional Balance at the Preschool Level," in N. C. Meier (ed.), *Studies in the Psychology of Art. Psychological Monographs* (I), vol. 45, 1933, No. 1, 1–12.

variability, balance was preferred. However, there was little or no correlation at this age with general constructive ability or with IQ, and many other examples might be cited which bear out this finding. In music, the repeated phrase or theme with or without variation, the usual return to the tonic and to the starting key, the similar complexity of the several parts, and the like, all serve to maintain a balanced composition.

Figure 87. Diagrammatic Representation of Balance through Direction of Interest (The drawings in this and the preceding figure are reproduced by permission from an unpublished study by Percy O. Danforth.)

Sequence and Rhythm. In the temporal arts there must be a contiguity or connectedness of elements, whether of thought or of sound. Coherence in verbal discourse is maintained by the development of a single theme, by an expressed relatedness of ideas, by the use of such words or phrases as "when," "although," "in spite of the fact that," "as a result," and so on, and by a similarity of meter, diction, and style. In music, it is facilitated by corresponding factors, including tempo, rhythm, loudness, timbre, relatively small intervals, and gradual changes. Sudden or violent changes in these components disrupt the coherence in both media, but serve to banish monotony and awaken interest. And yet the changes and interruptions are directed by a basic principle of coherence that is empathic in its nature, involving a return to repeated and therefore expected changes. In music and literature there is a successive building-up of tension to a climax followed by the relaxation of a conclusion produced by falling inflection and the return to the emphasized tone or the major triad, or the resolution of the preceding complexities of harmonization or plot. The sequence may be described as proceeding from expectation through suspense and surprise to fulfillment.

Regularly recurring accents produce rhythm, as in marching, dancing, the visual and kinesthetic accompaniment of the accented beat in music, and the stressed syllables in verse. The rhythm of dance music is its most pronounced characteristic, insisting as it does on accompanying bodily movement, while syncopation, a silent accent, is the strongest of all since "it forces the body to replace it with a motion. But a syncopated tune is not jazz unless it is supported by a monotonous accentless rhythm underneath. Alone it may confuse the listener, but with the rhythm definitely expressed syncopation intensifies the anticipated beat into an imperative bodily motion."[10]

[10] V. Thompson, "Jazz," *American Mercury*, vol. 2 (August, 1924), 645–647.

The musical score is divided into measures separated by bars, and the first note of each measure is regularly accented. The musical phrase, however, may be quite independent of the measures. A similar situation occurs between words in verbal phrasing, which is not always taken care of by punctuation marks. In such cases, the sequence may be incorrectly broken by the very nature of the notation or symbols employed, and hence pupils must be taught to disregard these arbitrary signs in maintaining the rhythm and forming the verbal or melodic phrases.

It should be pointed out that sequence and rhythm are not the exclusive property of the temporal dimension, but that an empathic feeling of movement may carry over into design. While the border of a piece of tapestry or of an oriental rug does not move, nevertheless, as one traces its recurring patterns with the eye, the regularity of changes gives the effect of movement.

Transition and Emphasis. A continuous line may be broken by a transverse line, as at the top of the columns of a Greek temple, or it may continue, as in Gothic architecture, to the pointed arch above. The junction point of a line that meets another head on at right angles may be softened by various kinds of transitional devices (Figure 88). The employment of these devices can at once be recognized in the planting around a house or where the front walk meets the doorstep, in the base of a column, and in ornamental iron work. It may be managed by introducing units that gradually increase or decrease in size or intensity to build up to a climax or crescendo and then gradually diminish in force.
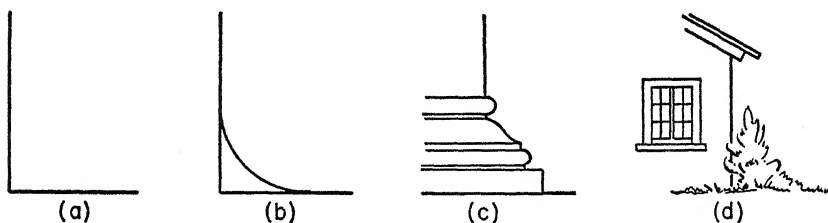
Figure 88. Transition in Design (*a*) No transition; (*b*) simple transition; (*c*) transition in architecture; (*d*) transition in landscape design.

In the course of the development of a temporal theme, certain parts are accented because of their significance. Similar dominance and subordination are practiced in the visual arts, in which mass, distinctness of portrayal, color effect, and light are employed, as well as the direction of lines, which tend to point to the important part of the picture. This is especially noticeable in the Madonnas of the Italian Renaissance, in

which the center of interest is the Christ child. The spotlight is used to exaggerate the effect in the theater.

Contrast and Texture. Contrast effects have been previously alluded to, not only in connection with emphasis and transition, but throughout the varying expressions of pattern and variation. Interesting contrast effects are produced by introducing variation in shape and color, light and shade, decorative treatment, in mood, in assonance and dissonance, tempo, loudness, rhythm and melody, and in the conflicting motives of the characters portrayed. Such contrasts tend to bring out more clearly the distinctive quality of the several patterns, and to result in a product that is psychologically more satisfying than one would be alone.

Texture is the result of smaller contrasting effects of a surface, described as rough or smooth, coarse or fine. It is evident in the difference between granite and marble, burlap and silk and is noted when a surface is rough enough not to give a glossy reflection of light, but instead to blend the colors it reflects. Thus a common brick wall may be said to have a more pleasing texture than one of pressed brick, and an eggshell finish than a gloss on furniture. Harmony in texture is sought in interior decoration in which a brick fireplace, reed furniture, pottery, and iron or brass andirons and fire tools have a harmonious coarse texture, while silk or damask upholstering is less appropriate for oak furniture than for walnut or mahogany. In sculpture, texture is modified by the material chosen and the smoothness of the finish, both of which should be appropriate to the subject. Delicate beauty cannot be portrayed adequately in rough-chipped granite. In painting, texture is represented by the brush work and by highlighting that brings out glossy surfaces. In music, texture may be spoken of somewhat figuratively as smoothness of tone, contrasting in the string bass and the flute. There is a place in art for all textures, but their harmonious and contrasting effects may be handled with varying degrees of skill.

Unity. The elements of esthetic composition that have been briefly described must be brought together and harmonized in various ways so that a single unitary impression is created. An ordinary landscape as it might be photographed does not possess such unity, though the photographer can place his camera and narrow the view that he takes to produce greater unity than would otherwise be revealed. The artist will rearrange the composition, changing the proportion, balance, and emphasis so that the details seem to belong together and to have something in common. Not only must design and color harmonize, but both must fit in with the prevailing mood of the piece or the thought or idea

it is intended to convey. If conflicting lines or themes or motives are portrayed, they must have a reason for being there and must be resolved in some all-pervading purpose if unity is to be maintained. If one asks what this character has to do with the plot, or how that design fits into the picture, or what a change of meter in the poem or of tempo or mode in the music is for, he does not perceive the unity of the pattern or else it is lacking. Different styles of architecture in the same house, a poem which is torn between expressing beauty and pointing a moral, a picture in which the persons portrayed all look in different directions, a modernistic house with Victorian furniture, a solemn hymn set to a jig tune— these random samples suggest the meaning of the lack of unity. Without it, an object is a scrap heap; with it, the artist has gone a long way in the direction of creating a work of art.

3. Appreciation of Art

Ways of Appreciating. Appreciation is essentially a contemplative esthetic experience. It consists of enjoying the various psychological aspects of the world of nature and of art, and it is enhanced by the ability to recognize the many kinds of patterns of beauty that can be found in it. Different ways of appreciating can be distinguished, though no one of them is necessarily preferred over another. The first way may be called the *sensuous* or hedonic, in which the sheer beauty of tone or color or line provides a thrill of joy and satisfaction. The second is the *empathic* or intra-subjective, in which the one who appreciates feels vividly the mood or emotional significance of the composition. The third is the *associative*, in which knowledge, ideas, and images stimulated by works of art are enjoyed. The fourth is the *utilitarian* or functional, art being viewed as useful or supplementary to the main business of living, whether it be to exalt the owner, or to teach a lesson. The fifth is the *analytical* or critical, in which the various esthetic factors and techniques of performance are noted, analyzed, and compared, and perhaps formulated into general laws. And the last is the *autonomous* or mystical, in which the formal elements are appreciated in the complexity and beauty of their design.

The Influence of Instruction. Classes in art appreciation have often failed in their manifest intent. They have taught pupils *about* art, and favored the analytical and overintellectualistic or scholarly approach, whether it has been in English literature or in more infrequent classes in music appreciation. They have often failed to establish a point of contact with the pupil, and instead have presented works of art that are far

beyond his comprehension, resulting in unpleasantness instead of satisfaction. Ballads, folk songs, sentimental paintings of dogs and horses and homelike scenes, portrait busts, and well-built houses suggest the appropriate level of enjoyment for beginners whether in junior high school or in college. Important, too, is an emphasis on the practical arts that have a utilitarian aspect—posters, window displays, handicrafts, furniture design, interior decoration, and landscaping. All of these provide abundant examples in any community of good and of poor artistry and on a level that can be understood and appreciated by the great majority of people.

The rôle of the teacher is that of one who knows and enjoys in a wholesome, robust, and friendly way; the effeminate type of artist must have many compensating characteristics if he is to have a prestige position among young people. The teacher's responsibility is to point to the patterns of various sorts that might not otherwise be noted, but which may be appreciated when they are discovered. He must be enthusiastic about the patterns that pupils themselves discover, not responding like the child who says, "That ain't nuthin', look a' this!" Rather he will agree, though the picture, design, or theme or melody may be awkward, or bombastic, or drip with sentimentality, and then say, "Yes, and did you notice this, too?" The development of taste is an important objective, for taste implies discrimination in appreciation. Preferences will change as children mature, and they will improve if given a proper environment.

Group Influence in Appreciation. While appreciation is essentially an individual affair, it is influenced in many subtle ways by the presence of others. They may at times interfere with one's enjoyment when they jam around a picture at an exhibition or talk at a concert, and one has to learn to shut out these distractions. Yet, one's enjoyment is often enhanced by the realization that others are enjoying the same thing at the same time. And one likes to compare notes, as it were, about a sonata or painting afterwards. The exchange of views about esthetic experiences is a definite means of development in appreciation.

4. CREATIVITY

The Contribution of Creativity. If one has tried to write verses or songs, paint pictures, or model in clay, or if he has ever made a spoon, a table, or even arranged a small exhibit in a display case, he will probably have greater respect for the work of those who do these things extremely well. The same is true in the interpretive arts, especially in playing

a musical instrument. By such experience the pupil can get a measure of understanding of the difficulties involved, and can learn to recognize some of the elements that go into the making of an object of art. Fortunately, one may enjoy all kinds of art forms without being able to create any. But he can perhaps appreciate more understandingly if his knowledge of the art is based on sensorimotor experience.

Group Influence in Creativity. The social influence is important, not only in appreciation but also in its creative aspects. The speaker, actor, or musician develops his skill in seeking to interpret the writer or composer before an audience. Like the dramatist or composer, who expects that his work will be produced, the painter, as well as the sculptor or architect, expects his work to be seen. Of course, the more he seeks to gain the plaudits of the crowd, the more he becomes a performer and less of an artist. But the realization that others are also writing poems, or the comradeship of the orchestra, the chorus, or the studios where work is going on, is a spur to endeavor and a confirmation of the feeling that what one is doing is worth doing. Thus mass education need not be inimical to artistic development, but may contribute to it. And, furthermore, the participation of pupils in orchestral, choral, or dramatic work provides an opportunity for regulated cooperation, which is a definite educational objective. The voluntary subjection of the individual to the demands of the total harmonious pattern can be practiced in these ways —and in group games—and practically nowhere else in the school program.

Interpretation and Creativity. Creativity in education at one time became such a fad that some enthusiasts even spoke of creative spelling! In the art field, however, due attention should be paid to the creative aspects of the interpretive arts, including singing, playing instruments, reading and reciting, acting, and esthetic dancing. All of these require a considerable amount of training and skill.

An original work of art is conceived and set down in a system of symbols that are little more than indications of what is required. The interpreting artist must, in a real sense, re-create the work of art. He must himself "get the idea" as it were, much as he does when the solution of a problem is explained to him. His technique enables him to present the work as a whole and in its details in the right way. It is probable that school children are incapable of interpreting works of art they have not had the experience to comprehend; and this lack, together with their undeveloped skill which does not permit them to interpret what they do understand, is responsible for the lack of appeal of the usual amateur

performance. As in the arts that are primarily creative, technique and understanding may develop together.

Creativity and Insight. Psychologically, the creative process is very elusive. It can be observed only introspectively and then only in retrospect after the creative act is completed. Even then, just what took place cannot be determined any more than one can determine what happens when a drawing in reversible perspective shifts back and forth. Physical responses can be studied as well as the sources or elements of which the product seems to be composed. But such approaches do not describe the process of creation. However, it may be surmised that the phenomenon is very similar to, if not identical with, that of insight. Components of experience are abstracted from their familiar pattern and recombined into a new organization. Thus the discovery of a solution to a problem is a creative act even though the outcome is not a work of art. The difference lies in the attitude with which the solution is regarded. If it is merely a way to get what one is after, or even if it is a symbol or equation that passes the test of "agreement" and represents more adequately the nature of relationships of the objective world, one may consider it a product of rational thought and no more. If, however, the new pattern is such that one can say, "How beautiful!" or if it affords satisfaction in itself apart from any practical function it may serve, the work may have esthetic value.

The Esthetic and the Utilitarian Solution. Considerable impetus in recent years has been given to the view that what is *functional* is artistic and what is not functional is not artistic. What was once functional in architecture, the flying buttress in medieval cathedrals, for example, tends to be retained as ornament when it is no longer needed. But this and other decorations are swept away in the enthusiasm for the purely functional. Undoubtedly, the design of a building or an implement may be such that it takes the shape demanded by the material of which it is made, or serves the purpose for which it is intended, but at the same time the solution may or may not be artistic. To satisfy the utilitarian criterion alone does not guarantee esthetic excellence. A dormer window that solves the problem of the lighting of a second-story room may be an eyesore, and, on a larger scale, the industrial waterfronts of most American communities, though definitely functional, may be a disgrace. A brick is a functional construct, but to have esthetic value it must be placed in certain relationships with other objects or persons, its color and texture must be brought out or harmonized with other colors, and so on. The artist, in his composition, can arrange the familiar objects of

experience, including the most unlikely in such a way as to create a work of art, whether it is functional or not. Likewise, the engineer may design an efficient construct that may or may not be artistic. Function in itself is not esthetic, it is utilitarian; and to identify the two is to destroy the meaning of each.

Functionalism in space-time patterns becomes efficiency. One sometimes even hears a reference made to a beautiful demonstration, surgical operation, or machine process. This usually means a perfect adaptation of means to end with no wasted motion; but, again, one is in danger of losing a useful distinction if such adaptations are not distinguished from creative art. The purely automatic act or process at one extreme and aimless activity at the other are not necessarily art, however efficient one may be, or however enjoyable the other.

The Nature of Creativity. Artistic creativity may be said to involve four parts. First is the process of *selection* of some elements and the elimination of others in harmony with the esthetic principles previously set forth. Perhaps the most complete study that has ever been made of the sources or elements selected in the composition of a work of art is that of the writings of Coleridge, who kept quite a detailed journal, recording much that he read and thought.[11] By piecing together many clues, most of the words and ideas which appear in his imaginative writings were found. For example, in *The Rime of the Ancient Mariner,* Coleridge described the "water-snakes":

> "Within the shadow of the ship
> I watched their rich attire:
> Blue, glossy green and velvet black,
> They coiled and swam; and every track
> Was a flash of golden fire."

In the scientific and travel literature which Coleridge had perused there were described "water-snakes" that were "often observed near ships at sea in the night" that "made a kind of artificial fire in the water." They were "green, yellow, black, and white." Some were "pale gold," "with blue and green specks," while at the gills is "a little spatula . . . encircled with silver, and velvet black."

A similar attempt to discover the sources of children's drawings has been made.[12] The instructions were: "Make the best drawing you can. Tell me the story of the picture as you draw it." Then the sources were

[11] J. L. Lowes, *Road to Xanadu: A Study in the Ways of the Imagination,* Boston: Houghton Mifflin, 1939.

[12] V. B. Grippen, "A Study of Creative Artistic Imagination by the Constant Contact Procedure," in N. C. Meier, *op. cit.,* 1933, 63–81.

traced. They turned out to be slightly modified memory images, improvised themes (e.g., "The Wedding of the Rats") in which previous experiences were combined, the selection of elements of detail, color, etc., from previous experiences, the vivid aspects of larger experiences with some detail omitted, and sometimes a continuing experience fused into good composition involving a rearrangement of the parts. An "untalented group" made generalized depictions of simple objects or stereotyped forms with little or no verbal criticisms and in a short time. A "talented group" created their own compositions, commented more, and took longer.

The second part of creativity is the process of *grouping*. Composition refers to the imaginative patterns that the artist represents by means of the materials of his art. Psychologically, it takes place as a part of the process of selection, since the forming of the pattern involves the processes of abstraction, selection, and elimination. It may be illustrated by a child who has three square blocks and three long ones and selects the latter to build an archway. Some children were tested in their ability to arrange toy model trees and bird bath on a small-scale lawn in the angle of a wall.[18] While there was great variability, definite preferences were shown.

The third part of the creative process is *technique*. The artist must be master of the tools of his trade. He must know pigments, color effects, harmony, or word meanings and connections, as the case may be. Talent flowers early, but the blooms have little charm if the artist hasn't developed his basic artisan's knowledge and skill. Self-expression in children and the desire to create should perhaps come first instead of enforced training without the desire; but self-expression should not be the be-all and the end-all, or we shall be trying to raise up a race of dilettantes. The product is worthless and the process lacking in enjoyment and satisfaction if the skill is not developed as the capacity increases.

The fourth part of the creative process is *evaluation*. The true artist is his own best critic. Seldom is the work as it first comes from his pen or brush the work which the public hears or sees. He must rework, rearrange, modify, and change as he proceeds, and in some cases, particularly in music and literature, after it is "finished." A little more emphasis here, a better word there, a change in rhythm, a rewriting of a scene or passage—these things must be done to meet his own exacting standards.

Esthetic Standard. Many and elusive are the standards by which a work of art may be judged. There is general agreement on the extremes.

[18] K. S. Whorley, "An Experimental Investigation of the Sensitivity of Children to Compositional Unity," in N. C. Meier, *op. cit.*, 1933, 26–45.

A child's poem and a Shakespearian sonnet, a stone ornament and a statue of Praxiteles, a popular tune and a Bach fugue, are all works of creative imagination. But, since in art every man is entitled to his own taste, differences of opinion are to be expected. Obviously, one kind of standard depends on the *way of appreciating* that is accepted, whether sensuous, empathic, associative, utilitarian, or autonomous.

Another standard is *cultural*. There are styles in art as in other things —at one time architecture must be neo-classical, at another modernistic; at one time painting must be representative or meticulous, at another abstract or careless in the details of technique; at one time poetry must be romantic, at another imagist; at one time music must follow one set of rules, at another, another. The academicians are the ones who set up the rules derived from past performances. Meanwhile artists are constantly experimenting with new techniques and new methods. A cubist painting, a Strauss waltz, or a front porch is as "dated" as a hoop skirt. Different groups at different times, in different places, and in different stages of development view works of art according to their own cultural frame of reference.

A third standard is *originality*. Art of the present that imitates that of the past century, no matter how well, while it may be attractive and charming, finds difficulty in getting a first-class rating. It is not difficult to write that which "was poetry once," but it is quite another thing to develop an art out of the environment in which one lives.

A fourth standard is *significance*. The work of art is an expression of some significant experience of the individual who creates it and of him who appreciates it. It must mean something important. This is one reason why the love motive is so often repeated, for it is one theme that is of transcendent importance to nearly everyone. Another theme is the accomplishment of some enterprise involving difficulties of various sorts; another is that of personal danger, and still another is the conflict of forces in which the failure of one side would result in the destruction of one's group. Such themes frequently recur in poems and stories, and in the program notes and art gallery guidebooks. Less portentous themes also provide significant esthetic experience, often as mild sentiments of nostalgia or longing or regret or hope, while apprehension or the contemplation of beauty may often be significant in itself, enough to cause the beholder or listener to pause for a moment with joy and view it in retrospect with satisfaction.

A fifth standard is *complexity*, though it is a difficult one to apply. A too simple rhythm or melody, a too obvious plot, or too little variation of the theme—products with these characteristics are not great art.

They contrast with the masterful development of the sonata form by Beethoven, the intricate delineation of character by Shakespeare, the delicate patterns in stone in the Cathedral of Chartres and the careful detail of The Last Supper by Leonardo. But complexity is not to be identified with the ornate. The greater art is that which follows the esthetic principles of balance, unity, variation, and the rest through intricacies of transition, sequence, and contrast that are new and that are liked. Simpler creations may be masterpieces, but they must be judged in their own class. Folk tunes and ballads, domestic architecture, silver utensils, and other creations may be well or poorly designed, and so may be artistically good or bad.

Aptitude, Talent, and Genius. Creative ability in art is like other special abilities in which there are great individual differences. Whether the ability is in the field of sports, in mathematics, in making money, winning votes, or making inventions, some people have it, and some haven't. The factor of environment is important in providing the necessary training, but the most perfect environment cannot alone make an artist. Evidence of the hereditary character of such ability is to be found in talented families. Perhaps the most notable is that of Johann Sebastian Bach, who had three brothers, five nephews, five first cousins, three paternal uncles, three great-uncles, and six sons who were all professional musicians, as were also his father, grandfather, and great-grandfather.

But talent often turns up outside of such families. Where it appears without opportunity for training, evidence is strong for the hereditary factor even though no genius is found in the immediate family. Such evidence may be illustrated by the case of Loran.[14]

It seems that Loran, who lived in a one-room cabin with his parents and four other children in the Ozark country fourteen miles from any town, state highway, or railroad, was blind from birth, the condition being caused by congenital double cataract. At the age of seven, after a series of operations involving the removal of the natural lenses, giving the subject a fair vision with the aid of two sets of special cataract glasses, one for ordinary vision and one for reading large type books, he showed much more than the usual talent even for an older child. Many tests were given, including a Stanford-Binet, which gave an IQ of 116, when the subject had been going to school but four months, half of the time when he was blind. Loran painted in the presence of the investigators and many of his paintings were photographed. About 100 in all were

[14] N. C. Meier (ed.), *Studies in the Psychology of Art, Psychological Monographs* (II), vol. 48, 1936, No. 1, 155–163.

studied. His pictures were traced to the sources which were also photographed for comparison, revealing that the products were not just realistic copies but showed excellent composition even from the adult point of view. Such talent appearing in an individual in whom there was no opportunity for its normal development, and no instruction, makes a strong case for heredity as the determining factor.

An interlinkage inheritance theory has been suggested to the effect that talent appears more frequently in people whose ancestry includes those who have been craftsmen of one sort or another—carpenters, cabinet makers, weavers, engravers, lithographers, instrument makers, and the like. Information is meager concerning Loran's family background, and, though one or two such relatives are reported, this does not preclude the possibility of there being others.

A few comparative studies have been made of the psychological characteristics of talented and untalented individuals, as a result of which certain conclusions may be tentatively put forward. In general, it is true that no single psychophysical characteristic is present in all those having artistic aptitude, and that one talent possessed in a high degree may compensate for a lack of others.[15] A list of factors in artistic aptitude has been drawn up on the basis of a ten-year study in the field of the psychology of art.[16] These factors may be briefly summarized.

1. *Manual skill.* Only nine out of fifty-eight nationally known artists reported no craftsmen in their families, but of these nine, seven reported the hobbies of their parents to be painting, weaving, photography, mounting rare birds, or wood-carving. Many of the talented children in painting also have manual skill in other lines.

2. *Energy output and perseveration.* Talented children at an early age persevere in their art work, continuing to be absorbed at the easel for long periods of time, and when their interests are later turned in other directions, these are apt to be in crafts of various sorts.

3. *General intelligence.* Artistically talented children generally rank well above the average in intelligence as measured.

4. *Perceptual facility.* Artistically talented children absorb and "drink in" experiences of significance for works of art. They are better in tests of form discriminations, observe more accurately, and recall observed materials in more detail.

[15] H. T. Manuel, *Talent in Drawing: An Experimental Study of the Use of Tests to Discover Special Ability*, Bloomington: Public School Publishing Co., 1919.
[16] N. C. Meier (ed.), *Studies in the Psychology of Art, Psychological Monographs* (III), vol. 51, 1939, No. 5, 140–158.

5. *Creative imagination.* Artistically talented children are superior in the construction of objects and situations from meaningless forms, and show greater originality in line drawings, and greater ingenuity in rearranging elements into compositions having some degree of esthetic excellence.

6. *Esthetic judgment.* Esthetic judgment is defined as the ability to recognize esthetic quality residing in any relationship of elements within an organization. This is not merely a matter of applying rules, but it undoubtedly develops with age and experience. Talented children are superior to others in this regard, employing the ability not only to works of art in general but in self-criticism of their own endeavors.

5. ART IN SCHOOL

Literature. While the principles enunciated in the preceding sections apply to some or all of the arts, their relationship to certain school subjects where the esthetic emphasis is particularly significant should be pointed out.

Since English is universally required, and since it has an established place in the curriculum, literature might properly be the first of the arts to receive attention in the program of promotion of esthetic values. The movement for wide reading (to replace the single reader) has gradually been moving up through the elementary school and promises to replace the doing to death of a few required and often not very literary classics in high school. The techniques of linguistic scholarship do not need to be introduced on the secondary level, but a beginning can be made in answering the recurring juvenile question: What makes one book "better" than another? Ballads, parodies, and verses with a good "swing," though perhaps lacking the highest poetic values, can gradually introduce children to the enjoyment of rhythmic literary forms. Though proof is lacking, it is probable that if pupils become interested in reading they will tend to imitate the style of some of the things they read, and a good deal of the usual formal teaching may become unnecessary.

Tests of ability in the literary field are still very few, though materials on reading and achievement in other phases of English grow rapidly in number. In one test devised some time ago, there are two series, X and Y, each consisting of thirteen differing stanzas; each stanza is rewritten in three ways, one to make it prosaic with irregular meter, a second to make it oversentimental, a third to make it sensational and bombastic.[17] Those taking the test are directed to indicate the one of each group of

[17] A. Abbott and M. R. Trabue, "A Measure of Ability to Judge Poetry," *Teachers College Bulletin,* Fourteenth Series, No. 2, 1922.

four they like best as poetry, and the one they like least. Only upper-level high-school and college students are capable of making the distinctions; the results indicate some of the types of verse preferred by different age and cultural groups.

Although the poetic writing of children usually shows the immaturity that would be expected, some of their work compares favorably with the juvenile verse of poets who later attained eminence.[18] The techniques of presenting such statements as will call it forth are not too well known or easily acquired. One procedure is described below:

"Thanksgiving will soon be here. They may tell me about it—in their own way; and, if they do tell me, it will be good—because their own way is always good."

Miss Curtis walked into the room thoughtfully but did not once eye the [third grade] class professionally or call it to attention. She seemed really to be looking out the window while, musingly, she let fall the word Thanksgiving.

Then she wondered, really wondered—as if to herself, what she, Nell Curtis, should be thankful for. It was so well done,—so different from the conventional mastery of a class by means of the drawing-out question—that it took me completely off my guard, and set my mind wondering, too. . . .

Then she just said nothing at all, while she continued to gaze thoughtfully at the bare trees and grassy hummocks of Morningside Park. . . . When a boy spoke thoughtfully "under his voice"; and another followed and another.

They were not using the accustomed classroom speech, they were conversing in the low, contented, slow-measured syllables of self-communion. Miss Curtis could do that with children—cause them to lose the conventional pose of being other than themselves. As she accepted (and so approved) the voice of their secret and seldom heard personality, they lost their fears of alien standards, strengthened the deep feeling of contentment with their own sure ways of speech.

She had moved so shadow-like to the blackboard that no one was disturbed. They continued to speak on slowly with easy long silences between, while with her back to them, she scribbled on the blackboard an illegible shorthand of her own.

At the next period the things the children had said were written in a clear hand on the board, and selection and amendments were made by

[18] L. M. Terman (ed.), *Genetic Studies of Genius*, Vol. III, B. S. Burks, et al., *The Promise of Youth: Follow-up Studies of a Thousand Gifted Children*. Stanford University: Stanford University Press, 1930, Chapters 23–28.

the children. Later the lines were grouped and became "A Hymn of Thanksgiving" recited by selected third-grade pupils:

We give thanks for the beautiful country that lies around us.
We give thanks for the grains and vegetables and fruits prepared for us.
We give thanks for the growing trees and the flowers about us. . . .
We give thanks for the cloth to make sails and wood to make boats
    to sail on the water.
We give thanks for the little streams that flow.
We give thanks for the tide that rises and lets us go out in our boats.
We give thanks for the sea with fishes in it.
We thank God for all the living creatures on the earth.

We give thanks for the beauty and love all around us.
We give thanks for all the things the Lord has set upon the earth.[19]

The process of encouraging creative expression and critical revision is far from adequately portrayed by this striking example. Those who wish to learn more of it should follow the fascinating description given by Hughes Mearns.[20] In the introduction to his *Creative Power* there appears a poem by an eleventh-grade girl which reveals the clear, unadorned loveliness of expression of the age that is speaking. It is entitled "Youth," and a part of it is given below:

> I must laugh and dance and sing,
> Youth is such a lovely thing.
>
> Soon I shall be old and stately;
> I shall promenade sedately
>
> Down a narrow pavement street,
> And the people that I meet
>
> Will be stiff and narrow too,
> Careful what they say and do;
>
> It will be quite plain to see
> They were never young like me.

[19] From *Creative Power* by Hughes Mearns. Copyright 1929 by Hughes Mearns. Reprinted by permission of Doubleday and Company, Inc. (Somewhat condensed.)
[20] Hughes Mearns, *Creative Youth: How a School Environment Set Free the Creative Spirit, and an Anthology of High-School Verse*, Garden City: Doubleday, Page, 1925.

Music. Universal instruction in English equips more children with the tools for versifying than are provided with the knowledge and skills necessary for musical composition. And yet the appeal of music is fully as broad as that of literature, and many can learn to reproduce the compositions of the masters with sufficient skill to give pleasure to themselves and to others. Instrumental and vocal ensembles have shown the most rapid development during the past few years. And while periods for meeting are often pushed out of the regular school day, the importance of such organizations is recognized not only for the valuable group experience they provide for the individuals who take part, but also for their entertainment value in school gatherings. Musical organizations undoubtedly develop appreciation in pupils and occasionally encourage creativity, but otherwise these latter phases are rather neglected.

Many schools, of course, take advantage of the children's radio network concerts, and some are well supplied with recordings and adequate reproducing equipment. When the latter are not allowed in the school budget, homeroom organizations and parent-teacher groups have sometimes supplied them. But much depends on the skill with which teachers select and present recorded music: products that are too complex or too subtle, or the element of compulsion, or of effeminate artiness, can be ruinous in high-school classes.

Two standardized music tests are widely used. One, the Seashore *Test of Musical Talent*, previously mentioned, aims to measure the innate sensory discrimination necessary for instrumental and vocal accomplishment. Seashore has stated that discrimination of pitch is the decisive factor, a thing which he has contended is innate. Music supervisors have long taken exception to this pronouncement, and more recent experiments, as previously shown, have proved that proper instruction can perfect the singing and improve the tested pitch discrimination of even the least promising pupils. It may well be that the tests are in part, at least, tests of achievement.

It is important to realize that the qualities of which musical talent is composed are more numerous than those tested on the Seashore phonograph records.[21] The latter are classified as sensory capacities: pitch, loudness, time, and timbre, paralleling the known characteristics of the sound-waves—frequency, amplitude, duration, and form. In addition, there are certain more complex sensory forms—tone quality, consonance, volume, and rhythm. Then there are the traces and centrally aroused

[21] Summarized from the introductory chapter of C. E. Seashore's *Psychology of Music,* New York: McGraw-Hill, 1938.

sensations of musical imagery, imagination and memory, and there is "musical intelligence," which is probably not much different from any other intelligence, though it implies an appreciation of relationships between different sets of concepts. And there is the most elusive quality of musical feeling, all of these over and above whatever skill in musical performance a person may acquire.

Another, the Kwalwasser-Dykema *Musical Tests* series, also on records, in addition aims to test feeling for tonal movement, taste, and pitch and rhythm imagery. The Kwalwasser-Ruch *Test of Musical Accomplishment* is a paper-and-pencil group test and deals with learned factors: musical symbols and terms, syllable names, detection of pitch and time errors, pitch names, time and key signatures, note and rest values, and the recognition of familiar melodies from notation.

No standards have been set up for excellence in composing or for the appreciation of compositions of different types and of varying complexity.

The Pictorial Arts. In the more progressive schools considerable encouragement is given to the development of pupil skills in drawing and painting, but the possibilities of different kinds of media in school art have hardly been explored, and "appreciation" is apt to be at a rather low ebb, in spite of the excellent prints that may adorn the walls of the corridors. To various kinds of pencil, pen, and crayon drawing and design may be added linoleum cuts, wood blocks, wood engraving, monoprint, dry-point etching, lithograph, copper engraving, and mezzotint, as well as finger-painting, colored crayon, water colors, and oils. There are also excellent possibilities in photography. Some of these require a good deal of apparatus and more technique than can usually be developed as a part of a school program. But many could be included, and pupils with their own cameras can learn much about the principles of design and composition. Every school, too, could well afford to build up a library of colored transparencies, some of the best that pupils themselves have taken, and some that are gradually being made available of the great masterpieces of art.

In general, the development of skill in the graphic arts is on a rather low level. One father wrote of his six-year-old daughter's experiences in the first grade: "Her art work looks the way her Daddy's did when he was in the first grade—also like her Daddy's present art work." There is no reason for such artistic backwardness among adults except that they have not been given an opportunity to learn. School posters and display cases suggest that the coming generation will not be so graphically

illiterate. Schoolroom walls, however, might well be covered with a cheap replaceable surface that would be decorated by the pupils every year. Elements of design, perspective, and simple representation can be as easily acquired as handwriting, and might afford increasing satisfaction to the children as they grow older and find themselves able to represent their impressions graphically as well as verbally.

Tests of art appreciation have been developed that have considerable reliability and validity. In the Lewerenz *Tests in Fundamental Abilities of Visual Art,* the following abilities are measured with a reliability of .87 ± .018: recognition of proportion, originality of line drawing, observation of light and shade, knowledge of subject-matter vocabulary, visual memory of proportion, analysis of problems in perspective, and recognition of color. In the Meier-Seashore *Art Judgment Test,* subjects are asked to state their preference for one in each pair of a series of 125 paired drawings which differ with respect to some point of compositional excellence such as the presence of position of a significant feature, suitability of background, quality of line, and so on. The test shows reliability coefficients varying from .71 to .85, and is judged valid by the fact that average scores show a trend upward from eighth-grade and high-school pupils to art teachers and supervisors. In the McAdory *Art Test,* pupils rank four pictures, which are larger, and color is introduced. Reliability and validity are about the same as for the Meier-Seashore test. Meier and McCloy report the construction of "an instrument for the study of creative artistic intelligence."[22] The apparatus resembles a small stage upon which clay-modeled figures can be placed in different arrangements. These and the backgrounds can be illuminated in different colors. The possibilities of the instrument for instruction and research are great, though, for the latter, standardization is difficult.

Sculpture, Architecture, and Landscape Design. The apparatus described in the preceding paragraph has possibilities for use in the three-dimensional arts, particularly in sculpture, architecture, landscape design, and stage craft. Little or no psychological work has been done in these areas, and, with a few exceptions, they are neglected in education. Some schools carry clay-modeling beyond the kindergarten, showing that pupils, when given the chance, do creditable work both in relief and in the round. For the most part, however, they require more knowledge and technique than pupils possess. But, from the point of view of appreciation, this should not eliminate them. Besides a wider use of slides and

[22] N. C. Meier, *op. cit.,* 1936, 164–172.

film strips, examples of monuments, public and domestic architecture, and city parks in the neighborhood could well be critically studied. Principles of landscape design could carry over to the pupils' homes, and a knowledge of the principles of city planning could produce a citizenry that would not perpetrate the monstrosities of the last century.

Dramatic Arts. In many schools the dramatic arts are represented by the senior play and nothing more, some have a Christmas pageant, and in a few the dramatic arts are tied in with the program of art instruction. The movement to make the assembly program a culmination of the work being done in the classrooms has brought about an informality that in many places needs further refinement in the direction of adequate presentation. To this end, instruction in speech, reading, singing, acting, and stage design and illumination can make valuable contributions. Puppet and marionette shows provide training on a less expensive scale, and excellent entertainment as well, and bring other arts into play, including writing, if original scripts are used, and costume design. Some schools develop their own radio programs, and dramatic and documentary films. Commercial motion pictures, as well as the many films available for school use, provide unrealized possibilities for dramatic criticism and appreciation.

Household Arts. While courses in costume design are probably quite effective, there is no reason why the applications in this area of the principles of harmony, balance, rhythm, proportion, emphasis, contrast, and unity should not be learned by all pupils, or at least all girl pupils in connection with their regular art work. While dress designers are clever at developing good color harmonies, egregious errors are made by buyers, and stout types are frequently seen in costumes which serve to enhance their already generous proportions.

The culinary arts are well taught in vocational classes, but a realization of the possibilities of harmony and contrast in table arrangement, tastes, and even textures and colors is not beyond the realm of possibility for all. One who plans or serves a meal or both need not throw the implements and utensils on the table, or perpetrate such combinations as cream soup, macaroni, mashed potato, squash, and pudding, unalleviated by anything one can get his teeth into.

Excellent work might be done in a modest but effective way through the use of models in applying esthetic principles to interior decoration. Appropriate hangings and furniture and the proper arrangement of the latter even in modest homes would considerably enhance their attractiveness. The art of flower arrangement might even be introduced in

moderate doses. The customary method of jamming flowers all together in a bunch was what undoubtedly led one young man, when he saw an artistic arrangement of a few flowers in his home, to ask whether the price of flowers had gone up!

Hand Crafts. Many school shops provide opportunities for pupils and others to make useful objects of art in wood and brass, but there are further opportunities in leather work, silver, jewelry making, glass blowing, weaving, and pottery. Some of these arts permit the development of individual patterns. And a knowledge of the principles of design gives an added appreciation of some of the delicate craftsmanship to be found in museums that would ordinarily not be noticed. Blanket and pottery designs of the Indians of the Southwest and of Latin America and the delicate proportion and balance of the vases of classical antiquity provide two out of many possible examples.

Commercial Arts and Industrial Design. Because of their utilitarian value the industrial and commercial arts have fared rather well. And yet as a rule pupils undoubtedly do not realize that many of the same esthetic principles are to be found in good advertising or show-window displays that were employed by the great masters of painting and sculpture. Lettering, printing, and typography in general need not be located in an isolated elective course that few know anything about. And the great strides that have been taken in industrial design under the compulsion of mass production and speed might well be understood by all high-school pupils. Although it is true that a streamlined tooth-powder can verges on the ridiculous, the improvements that the functional principle has brought to kitchen floor-plans and equipment are among the most outstanding innovations of recent decades.

6. The Esthetic Emphasis in Education

Summary of Educational Principles. If the esthetic development of pupils is to parallel their growth in other respects, four educational principles must be followed: (1) Adaption to diverse pupil interests by means of a *broader program,* including more work in the practical and applied arts, and a wider use of actual art materials, particularly museum exhibits, phonograph reproductions, and colored transparencies. (2) Adaptation to the age and *level of esthetic development* of the pupils, in the effort to develop appreciation, avoiding what seems puerile and childish, on the one hand, and what is too complex and subtle for them,

on the other. (3) A proper balance between *creativity* and *technique*, without forcing or neglecting either. In most schools there should probably be less formalism in both the creative and appreciative phases of art instruction. (4) A *correlation* of art instruction with other subjects of the curriculum, especially with general science and the social studies.

Advantages and Difficulties. The dangers and difficulties in setting up an adequate art program are numerous. On the practical side, there is the matter of cost and the present "overcrowded" curriculum, and there is also the difficulty of finding art teachers who understand children, or education, or more than one art. On the pedagogical side, there are problems of correlation with other subjects, adaptation to individual differences, and measurement of progress.

But there are many compensating advantages. They may be found on the negative side in the building-up of standards that perhaps will somewhat reduce the demand for the tawdry as a means of escape—detective stories and sentimental fiction in pulp or celluloid or on the air, manufactured to rule and ground out by the yard. Instead, an adequate art program may develop taste not only in art itself, but in the common experience of everyday life. It can provide opportunities for satisfying the needs of pupils, needs which they may not realize they have, and furnish genuine satisfactions not only during the school years but in after years as well.

Art as a Way of Life. If "art" is thought of merely as enjoying or even creating objects of art, valuable as these are, the importance of the program is greatly underestimated. Beyond this is an attitude of mind that is difficult to describe, but many of its aspects can be easily recognized. Some of these aspects can be briefly mentioned. First, there is the readiness to see and enjoy beauty in the various phases of nature and ordinary experience—not only in gorgeous sunsets and autumnal coloring, but also in a single flower or leaf, in the fog over the harbor, the leafless tree on a winter horizon, a group gathered about a camp fire, or a person seated at a table by a window, or a good dive, or a game of tennis or basketball. Things that are breath-taking in their beauty and charm are all about us if we but have eyes to see. One doesn't have to go into raptures about them; in fact, the vain effort of some people to describe how they feel might better not be made. Often a nod or a smile is enough to communicate one's feelings and be understood.

Then there is the desire to reduce the amount of ugliness within the scope of one's personal influence. Furniture, houses, lawns, parks, and

cities can all be made more decent and more attractive, and helping to make them so can add to one's enjoyment of living. If people know what is wrong with their environment and what might be done to improve it, the task is already half done. And if they have the training and skill to do some of the things themselves, they will not always be content with ugly lives. The slum clearance and housing projects, parkway developments, and the system of national monuments and parks are movements in the same direction, but they need the support of individuals who will not only contribute to them but who will also do their part as individuals with their own houses and plots of ground.

And, lastly, there is the carry-over into human relationships. Many things that one can say or do are neither wrong nor illegal, but are in poor taste. They lack the nice balance of a good design. Even the words used to describe such behavior show this. Some people are coarse, crude, overbearing, upstage, have a "swelled head," are dull or heavy in conversation, blatant, or shrill. It need not be urged that those with artistic talent are free from all such faults. Nor is it necessary to be "arty," overrefined, or to have a sweet disposition. Many a great character even among the unhonored and unsung is of a rough, homespun texture, or is a vibrant and colorful personality. But he whose life is admirable has a sense of balance, and proportion, in dealing with his fellows that naturally eliminates what is disagreeable and ugly from the picture. The life of such a one is his masterpiece, and it can be a guide and object of emulation to the apprentices and journeymen in the fine art of living.

In Summary

When the teacher thinks of the world of beauty in nature or art as perceptual patterns that one can learn to see or hear, just as one can perceive the utilitarian situations in arithmetic or spelling or in swimming or baseball, he is on the way to becoming a teacher of art whatever the subject he is teaching. The love of beauty probably cannot be inculcated, but it can be given a chance to grow among those who are sensitive to its varied aspects.

The patterns of beauty cannot be reduced to a single formula, but are built of many psychological experiences—the affective experiences of sight and sound, the sensitivity to small differences, the perception of shifting patterns, the imagery content, emotion and mood, the empathic feeling of oneself as a part of what one experiences, and the intellectual analysis of what it is all about.

The valued feeling of enjoyment derives from patterns of varying kinds. Order is essential, some kind of order. Things must be in proportion, with some kind of balance, if not symmetry. Elements recur more or less rhythmically with modifications, perhaps at fairly regular intervals. There is transition from one pattern to another, and emphasis on the figure in contrast to the ground. Contrasting parts are set off against each other in varying colors or intensities or textures, but pervading all is a central unity that binds the whole together. If one looks for these patterns, he can find them, and finding them is part of the fun.

All do not have to appreciate in the same way or in any one way. Sometimes one enjoys the sheer sensuous beauty of tone or color, sometimes he projects himself empathically into what he perceives. The scene or work of art may call up associatively nostalgic recollections of things long past, or it may have a bearing on immediate use. It may be analyzed or categorized, or its structure may be perceived with all the intricacies of its related parts. The skillful teacher can help in all this by furnishing the opportunities for appreciation, by starting where the learner is and not expecting too much, by indicating but not insisting, and by providing the group atmosphere that is conducive to esthetic enjoyment.

The teacher can also develop participant skills and encourage creativity, not only in the fine arts, but also in the household arts and in the crafts as well, where the same psychological and esthetic principles operate, and where everyday enjoyment may be found for more joyous living.

Questions

1. What is meant by empathy? Show its relationship to the different arts.
2. Indicate ways in which knowledge about art has increased your interest and appreciation.
3. Which of the arts do you enjoy most? Can you trace the history of your enjoyment to account for your interest?
4. How can a school art program be kept from being "arty"?
5. Suggest ways in which adequate art instruction might be used to supplement and strengthen some subject you have taught or are planning to teach.
6. How can the English teacher differentiate the esthetic from other objectives in methods and activities employed?
7. Discuss the several phases of development promoted by the staging of a puppet or marionette show.

8. How can the phonograph, the radio, television, the slide or film-strip projector, and the motion picture be used as a means of development of musical and artistic appreciation?
9. Give illustrations of wrong methods of teaching appreciation.
10. What esthetic principles are applicable to such non-representative art objects as the design of an oriental rug, a Bach fugue, or an "abstraction" in sculpture or painting?
11. Is surrealism unesthetic? How do you account for its use in advertising?
12. Is there any relationship between the Greek motto, "Nothing in excess," and the idea of art as a way of life? Discuss.

Readings

Boas, B. (Ed.) *Art Education Today: An Annual Devoted to Problems of Art Education.* New York: Fine Arts Staff, Teachers College, Columbia University, 1937 ff.
> The interested student will enjoy these annuals.

Cox, G. J. *Art for Amateurs and Students.* New York: Doubleday, Page, 1926.
> The characteristics of good (visual) art, illustrated by a large number of plates.

Diserens, C. M. *The Influence of Music on Behavior.* Princeton: Princeton University Press, 1926. (Rev. ed., 1939.)
> Anecdotal reports and experimental studies.

Dewey, John. *Art as Experience.* New York: Minton Balch, 1935. Abbreviated in *Intelligence in the Modern World.* New York: Modern Library, 1939, Chapter XIX.
> An interpretation of the meanings of esthetic experience.

Fowler, H. A. *Modern Creative Design and Its Application.* Ann Arbor: George Wahr, 1933.
> Principles of design are illustrated in interesting detail.

Goldstein, H., and V. Goldstein. *Art in Every Day Life.* New York: Macmillan, 1925. (Third ed., 1940.)
> Esthetic principles as exemplified in domestic architecture, interior decoration, and dress design.

Greene, T. M. *The Arts and the Art of Criticism.* Princeton: Princeton University Press, 1940.
> A scholarly analysis of esthetic principles with 300 illustrations.

Haggerty, M. E. *Art a Way of Life.* Minneapolis: University of Minnesota Press, 1936. Published for the Owatonna Art Education Project.
> An aspect of an esthetic life philosophy is expounded. Also see successive publications of the Project, including art units for elementary and high school.

Hartman, G., and A. Shumaker. (Eds.) *Creative Expression: The Development of Children in Art, Music, Literature, and Dramatics.* New York: John Day, 1932.

This reference and those to Terman and to Mearns in the notes of this chapter show some of the creative work that children can do.

Keppel, F. P., and R. L. Duffas. *The Arts in American Life.* New York: McGraw-Hill, 1933.

One in the series of volumes on social trends. See especially Chapters V–VIII, XI–XIII.

Meier, N. C. *Art in Human Affairs: An Introduction to the Psychology of Art.* New York: McGraw-Hill, 1942.

Excellent illustrations and bibliographies. See especially Chapter II, "Principles Underlying Art," and Chapter IV, "Creative Production and Artistic Talent."

National Society for the Study of Education. *Art in American Life and Education.* (Fortieth Yearbook.) Bloomington: Public School Publishing Co., 1941.

Though unnecessarily prolix, the yearbook elaborates some of the many developments that might take place in art education.

Pressey, S. L., and J. E. Janney. *Casebook of Research in Educational Psychology.* New York: Harper, 1937.

Reports a study in public school art, pp. 243–248.

Progressive Education Association. *The Visual Arts in General Education.* (A Report of the Committee on the Function of Art in General Education for the Commission on Secondary School Curriculum, V. E. D'Amico, chairman.) New York: Appleton-Century, 1940.

Possibilities for the study and teaching of art, emphasizing appreciation through creativity, for its value in furthering the worthy development of the student as a person.

Seashore, C. E. *Psychology of Music.* New York: McGraw-Hill, 1938. Also *In Search of Beauty in Music.* New York: Ronald Press, 1947.

Comprehensive report on the nature of musical expression derived from scientific investigations.

Shaw, R. F. *Finger Painting: A Perfect Medium of Self-Expression.* Boston: Little, Brown, 1934.

Interesting description of a form of art valuable as creation and as emotional release.

Skinner, C. E. (Ed.) *Readings in Educational Psychology.* New York: Farrar and Rinehart, 1937.

Chapter XII, see especially Section VIII, "Research in Creative Effort," and IX, "The Development of Artistic Appreciation."

Skinner, C. E. (Ed.) *Readings in Psychology.* New York: Farrar and Rinehart, 1935.

Chapter XIX contains some interesting anecdotal material on imagery

and imagination that is pertinent to a discussion of art—selections from Lowes, Titchener, and James (Section I), and a passage by Max Schoen (pp. 608–613).

The Stanford University Education Faculty. *The Challenge of Education: An Introduction to Education.* New York: McGraw-Hill, 1937. The place of the arts is discussed in Chapters X, "Modern Art Education," XI, "The Challenge to the Teacher of Music," and XIII, "The Dynamic Role of the Home Arts in Modern Education."

Social Learning—Adjustment and Participation

The Rôle of the School. As a child grows up, the conditions of social living make ever new demands upon him. Countless situations present themselves to which he must respond in one way or another. In America's past, the home and the church have been almost wholly responsible for training children and young people to make the right responses in social situations. But now, with the breaking-up of the older, more patriarchal form of home life as a result of such changes as the employment of both parents in gainful occupations away from home, the increase of divorce, and the compelling social activities of some strata of society, as well as the development of commercialization of amusement, the demand is becoming more insistent that the schools add instruction in social adjustment and participation to their other responsibilities.

While it is a comparatively new enterprise for the public schools of this country, owing to the tradition of the restricted program of our pioneer schools and to the narrowly professional character of our early higher education, it is far from being such a modern educational innovation as some would have us believe. From the primitive induction of the youth into the tribe, down through the medieval military, craft, and monastic disciplines, to the efforts of the English public schools to produce Christian gentlemen and of the totalitarian powers to develop devoted followers of the leader, the prime object of education has been the proper adaptation of the youth to the social order. The differences in educational systems have been in the techniques employed and in the kinds of culture to which adaptation was sought. Many private schools in our own country have emphasized a type product as much as scholarship, with dress and manners playing quite as important a part as the life of reason.

In the public schools, the social adjustment of the pupils has been largely neglected or left to the judgment of individual teachers. The difficulties of providing an educational program in this area are far greater in American schools than they were in their European precursors. In a land of free, tax-supported education for all, the unifying bonds of a single political or religious doctrine do not hold. Furthermore, in a period of transition like the present, conflicting customs make untenable some of the rules and regulations that were unquestioned in an earlier day, to which the disturbing voice of science has added her unprejudiced facts and caustic criticisms.

Satisfaction with the old, laissez-faire policy of the schools has therefore given way to a disturbed feeling that something ought to be done. The former concept of school "discipline" as practically the only official recognition of the problem of social adjustment, and based on time-honored, rough-and-ready, strong-arm methods, has been overhauled or discarded. It is now realized that expulsion and suspension are but "ostrich solutions." Retributive punishments, corporal or otherwise, have never really worked, except so far as they have served to shift the responsibility for social maladjustment, or to satiate the sadistic tendencies of the more powerful.

What changes will a scientific spirit make in school discipline? What can the schools do to educate for citizenship? How can psychology help in character education? Unfortunately, there is no patent medicine to cure the manifest ills of social institutions, and there is no panacea that can be introduced into a school to guarantee that the pupils will be well adjusted and integrated personalities when they leave it. For them the goal will be attained, if it is attained at all, by a process of learning, and for the schools the solution can be found only in setting up the right environmental structure, which includes the most effective instructional procedures.

1. The Need for Social Learning

Social Participation. Man is undeniably a social animal even if he is not always sociable. He must mingle with others to gratify his needs not only for the necessities of life but for many of its satisfactions. He buys and sells goods and services. He rules and is ruled. But the task of getting along in this interdependent world is not an easy one, though some are more successful than others. We say of one person that he committed a bad faux pas, of another, that he got off on the wrong foot, of a third that he is his own worst enemy. One of the claims made by fraternities and sororities is that they polish off the rough edges of their members,

and life in a college residence hall is intended to develop the student "socially." Some have "a line," others talk shop and nothing else, still others just don't know their way around, are shy and misunderstood, or perhaps are sensitive and overcritical. In spite of the wisdom of the past, and even of the supposedly beneficial influence of a liberal education, the competence of a large proportion of normal men and women in mere social participation leaves much to be desired.

Social Adjustment and "Delinquency." But social maladjustments often take a more serious turn. The young person responds in certain ways to which the society in which he lives objects. There are laws about it, and he is haled into court to answer for his mistakes. At various times people have become concerned about the high rate of juvenile delinquency, and have blamed the home, the church, and the school for not doing their duty in developing the character of children and youth.

If we would meet the problem of delinquency, we should know something of its underlying causes. But the causes of delinquency are not easy to discover. *Heredity* as a cause has been pretty well discredited in spite of the early efforts of Lombroso to discover "criminal types" and prove that criminals are born and not made. Heredity, when regarded as the cause of delinquency, becomes a scapegoat, and the conditions which seem to produce criminality are not likely to be investigated. For sex crimes and crimes of sudden violence there may be an endocrinological basis. Such cases seem not to yield to treatment. Kleptomania, the chief symptom of which is the stealing of quantities of objects usually of the same kind, and for which the individual has no need, is a nervous disorder probably in the same category as hysteria. But these types of cases are in the minority. The idea that delinquents are in general below average in intelligence is ill-founded, not only because apprehension is an inadequate measure of the frequency of occurrence of delinquent behavior, the stupid being the ones to be caught, but also because delinquents have about the same range of intelligence as that of the group from which they come.

Some *environmental conditions* undoubtedly tend to foster delinquency. If the social pattern is such that filching is a common practice, or that stealing automobiles is a daring and commendable adventure, there will be a high delinquency rate among the juveniles. But not all the inhabitants of blighted or delinquency areas are delinquent, nor are all the inhabitants of the better parts of town nondelinquent. The study of delinquent children has revealed that, so far as economic status is concerned, they are distributed according to the distribution of eco-

nomic status in the area in which they live. Nevertheless, the delinquency rate is higher in areas of low socio-economic status.[1] And school honesty, as measured in various ways, chiefly through the use of paper-and-pencil tests, has been found to correlate positively with socio-economic status.[2]

But, whatever the socio-economic level of the home, a number of *psychological influences* are at work. Children who can get what they want by teasing, crying, or indulging in a tantrum, who always have their own way, or who are punished harshly or unfairly, naturally form ways of reacting to directions, restraint, or other social regulations which later on may make trouble for them as well as for the school, and handicap them permanently thereafter. Alcoholism, parental quarrels, loss of parents, broken homes, illegitimacy, poverty, execrable living conditions, insufficient playground space, and the tutelage of hardened and bitter parole cases from reformatories all exert an influence.

William Healy made a study of a number of pairs of siblings, one of whom in each pair was delinquent and the other not.[3] In some cases the one who became delinquent was rejected, or thought he was. But in most cases there seemed to be no more reason for the social failure of the one than of the other.

The chief cause of delinquency, in all probability, lies in the elusive *conditioning* process to which individuals have been subjected over a period of years. If the misconduct of a young child is overlooked, smilingly approved, or rewarded, he will naturally come to include such behavior as a satisfactory way in which to satisfy his needs and desires. If, furthermore, his father, older brother, or other prestige person, with whom by the process of introjection he identifies himself, is guilty of criminal activity, his social judgment, conscience, or superego will tend to approve instead of to inhibit such conduct. When there is a conflict, chance events may have a far more important part than is commonly supposed. If in a moment of wavering, of a feeling of insecurity and rejection, the stimulus to take part in a "little job" is particularly strong, or if suspicion classes him with the guilty when he is innocent, the pattern of right conduct will be particularly difficult to acquire.

So far as the behavior itself is concerned, delinquent acts are psychologically similar to others, e.g., driving off in someone else's car and driving off in one's own, or writing the number 4 after 2 + 3 and writing

[1] V. M. Sims, *Score Card for Socio-economic Status*, Bloomington: Public School Publishing Co., 1927. See Chapter III.

[2] H. Hartshorne and M. A. May, *Studies in the Nature of Character*. I. *Studies in Deceit*, New York: Macmillan, 1928.

[3] W. Healy and A. Bronner, *New Light on Delinquency*, New Haven: Yale University Press, 1936.

it after 2 + 2. But in each case we have a wrong and a right response. The difference seems to be that in arithmetic the child gets the wrong answer because he doesn't know how to get the right one, but in stealing he "knows better." The significant factor—the one that is most often overlooked by those innocent of psychological knowledge and insight—is that, for the delinquent, what society considers the wrong answer may be for him the right one! It is the one which is most satisfying to him. It is the best thing he could do under the circumstances to get him what he wanted at the time—some fun or excitement, for example, the approval of prestige persons, or the satisfaction of the frustrated need for mastery by some aggressive action.

Parents, teachers, and law-enforcement officers could advantageously acquire a more complete understanding of the nature of the learning process as it applies in social situations. As things now stand, it is undoubtedly true that children are often taught to be delinquents by their elders—not only by the debased and criminal elements of the older generation, but by the well-meaning but ignorant who force children into frustrations and make the wrong responses more satisfying than the right ones.

Integration and Neuroticism. Another serious form of social maladjustment is to be found in those who are afflicted with one or another kind of neurotic ailment, and who range in the severity of their affliction all the way from the harmless queer to the violently insane. A somewhat disillusioned young man once made the observation that when he was a child he thought grown-ups knew all the answers. As he grew older, he realized that some were mistaken, but now he felt that most of them are screwballs! While this indictment may be a little severe, the ego-protective apparatus, the emotional immaturity, and the delusional systems that many adults exhibit suggest that there has been something lacking in their earlier training.

Various forms of mental disturbance have been discussed in Chapter VI. It will suffice at this point to recapitulate the kinds of help that are available. An individual is frustrated, disturbed, uncertain, worried, hedged about with difficulties, afraid. To whom, besides the charlatans, can he turn? Society has set up various agencies which may be arbitrarily differentiated as medical, psychological, and educational.

Medical attention is the matter of first concern for an individual who is physically or mentally ill. He must be taken care of, perhaps hospitalized, and, if his affliction is incurable, permanent care must be provided for his own good and for the protection of society. The psychiatric

treatment needed for mental ills is not as a rule furnished by the schools. Their task is to be on the alert to discover the possible existence of such handicaps, that cases may be referred to those who can give the proper treatment.

Psychological aid is sometimes provided by the school in connection with its educational program. This area, however, has been badly neglected in American education. The mental and social adjustments of pupils have as a rule been considered as no business of the school, which until recently has confined most of its efforts to "book-larnin'." The little testing and guidance work that has been included is often done by poorly qualified persons, and has been considered as just one of the "fads and frills" that can be allowed in periods of prosperity, and that can be shorn away when money is scarce. But conditions are changing, and training of guidance workers and school psychologists is becoming more adequate, with the result that appropriate diagnostic and therapeutic techniques are coming more and more to be employed.

Educational methods are likewise being developed to make learning in the social area more effective. These methods will be discussed in more detail later. In addition to educational procedures as such, the school has under its control certain social factors which are aimed to call out and habituate desired responses. These include a rather completely prescribed schedule and the influence of the group activities that go to make up a structured environment to which the individual learns to make proper adjustments. The pupil, however, is under many social influences over which the school has little or no control. It is to be hoped that educators will participate more fully with other citizens in effecting such changes in the community as will contribute to the social development of all its members.

Individual and Group Endeavor. We can hardly be satisfied with goals that call only for the passive ability to "get along" with others and avoid delinquency and neuroticism, although, if these were attained, the result would somewhat resemble the millennium. Along with these objectives is the need for motivating people in the direction of social values and of teaching them the techniques of group action.

There is hardly anyone who has served on a committee who does not know some of the weaknesses of a chairman, or the nature of the failures of those who present recommendations for committee action. There are right and wrong ways of trying to get things done, both perfectly ethical, but unequally effective. A democracy demands effective action on the part of its members, not mere compliance, or it does not remain long

a democracy. Children can learn the techniques of group action so that when they are through school they will not be at a loss to know how to get rid of corrupt public officials or how to introduce desirable modifications in local by-laws and ordinances, or in state and national laws.

2. The Social Environment as a Regulative Influence

Unfamiliarity. No individual can adequately adjust in an environment, the structure of which is unfamiliar to him. A child at his grandmother's, at camp, or at a new school may behave "badly," be homesick, or confused, and ill-tempered. Some initiatory rites are crude efforts to teach the neophyte that he is a part of a new social pattern that demands new kinds of behavior. Orientation periods for freshmen, training courses for new employees, internships and apprenticeships for skilled workers, probation periods for religious orders, newcomers' clubs for college faculties, and the like, all have as one of their chief functions the orientation of the novice in the intricacies of the social structure of which he is to become a part. Many schools have set up machinery for helping new pupils to find their way around among the other pupils and the teachers with whom they are to come in contact. Not so many schools have an adequate plan to introduce new teachers to the wheels within wheels in the new school community.

Complexity. No individual can adequately adjust to an environment that is too complex for him. A feebleminded or insane person is placed in an environment that is simplified both physically and socially, where he does not have to deal with dishonesty, competition, or life-planning for himself or others. As children develop from infancy to maturity, they grow in the capacity to respond adequately to increasingly complex social relationships. In infancy, the physical environment is a cradle (or its modern equivalent) and the social environment is the mother and father, perhaps a nurse, and a few relatives.

As the child grows older and the boundaries of his province are pushed outward to include the rest of the house and yard, the school, the street, and the playground, his capacity to deal with an increasing number of persons develops concomitantly. In adolescence, his world enlarges, and he may go away from home to college or to work. He becomes a citizen of his community and of his country. The persons who have been in control of his environment, as a rule, have not allowed it to become too complex for him. Just as his parents did not allow him to play in the street when he was two, so they do not trust him with the week's wages when he is five, or ask him to take charge of an adult meeting when he is

ten. They shield him from many of the terrible things in the world,
they keep him out of situations where he would be inadequate and
bring misfortune to himself or his family.

The control of the environment so that it will not be too complex
and yet complex enough to present an opportunity for growth and a
challenge to human endeavor is one of the most difficult tasks that
parents and teachers have to perform. If the situations the child must
meet are too complex, he will be constantly frustrated, he won't know
what to do, he may be baffled, cheated, injured, and enticed into groups
that wish him no good. If the situations are too simple, he will chafe,
revolt, or escape, or he will become subservient, a "sissy," mother's boy,
or perhaps too innocent, and quite unready to take his place in the adult
world when the controlling barriers are suddenly removed.

Conflicts, however, are to be expected, for the child or youth will be
sure to think that the control is too strict and narrow. "Mother knows
best" will not always be an adequate explanation. The adolescent is an
adult in many ways, and he may know some of the complexities but not
all of them. The school or college was in existence before he came to it,
and it will be there after he has left. It will not allow him to express
himself in editorial columns or elsewhere in a way that will injure the
institution. As the regulations clamp down, he cries out, "Paternalism!"
and complains in the same way he did when his parents objected to his
driving the family car when he was twelve years old, and to his coming
in at three o'clock in the morning when he was fourteen.

Such revolts are to be expected. In many cases, a sympathetic explana-
tion of the reasons for the regulations or the consequences of disre-
garding them is sufficient. It is better, however, to have the conditions
clarified before any untoward event occurs than to wait until the trouble
has started and then apply penalties. The antagonism so aroused is likely
to create more opposition than when reason and foresight are given a
chance to operate.

Folkways. The customary ways of speaking and acting in any group
are called folkways.[4] They differ from group to group; and, while they
often seem unimportant, they must be learned by those who would
become fully accepted group members. Some of them can be classed
as matters of *etiquette*, which includes a wide range of social behavior
prescribed officially or otherwise, such, for example, as which fork to
use, when to call, what form to employ in writing letters, what kind of

[4] W. G. Sumner, *Folkways*, Boston: Ginn, 1907. Previously mentioned as an
aspect of the school neighborhood in Chapter III.

clothes to wear on different occasions, and the like. While the "decrees of fashion" in dress and conduct carry no legal penalty for disobedience, and considerable flexibility is permitted, yet an ignorance of accepted ways, or conduct not in accord with them, places an individual at a disadvantage, whether fairly or not, and determines in large measure the kind of treatment he will receive. Thus, one who says "Why ain't cha go'n' to do it?" or "Get out of my way, you fool!" or "Your brother is rather stupid, isn't he?" may wonder why he isn't popular.

Courtesy implies a greater respect for the personality of others, though most of the rules are formally and conventionally prescribed. One says "please" and "thank you," doesn't interrupt, allows another to precede him, and defers without necessarily showing deference. The acceptance and practice of the common rules of courtesy to which the group subscribes make for a common understanding and smooth the wheels of social intercourse.

Esthetically judged, social conduct is said to be in good or poor *taste*. A person who is purposely and obviously better dressed than other members of a gathering, who harps on his personal misfortunes, who discusses his digestive difficulties indiscriminately, who talks too much at a public meeting, who is somewhat boastful or deprecatory about his achievements, who discusses the cost of his or others' unnecessary purchases, who questions the motives of those who disagree with him, loses his temper, or does numberless other such things is quite within his rights, but his actions are in poor taste.

Appropriate social behavior may follow prescribed forms, involve a recognition of the worth of other individuals, and conform to a general pattern of excellence. The ability to act in particular situations according to these criteria is called *tact*. One seeks so to control the structure of his environment by his own words and deeds that he does not put another at an unnecessary disadvantage. The tactless person unwittingly hurts another's feelings or arouses his antagonism perhaps by belittling his nationality, his church, occupation, or family. He is harshly critical, he makes invidious comparisons, he is an adept at ridicule, he may be said to have "a sharp tongue," he makes enemies unnecessarily, and may be judged malicious or stupid.

The folkways differ in different groups. The table manners of the teacher may be considered crude by the parents of some pupils and a bit "sissified" by others, and the same is true of other folkways. One would not expect to hear one workman say to another, "I beg your pardon, Joe, but I believe you dropped your wrench." There is a tendency for the schools to try to educate the children away from their back-

ground. However, the basic quality of tactfulness, as acting on the basis of an appreciation of the feelings of others, can be expressed in any idiom; and it is the social point of view that is important whatever the conventional forms may be that are called for by the books on etiquette.

Mores. The folkways that are considered necessary for the preservation of the group are called mores. If an individual fails to acquire these customary ways of acting, he is not merely snubbed; he is punished. The members of the group ask each other, "What will become of us if this kind of thing goes on!" And if they decide that they would be the ones to suffer, the individual is expelled, imprisoned, or killed. The chief transgressor is the dissenter—in religious groups the heretic, in political groups the revolutionary, and in economic groups the thief. Death has often been considered too good for such people, so various tortures have been devised that the group may have added vengeance on those who are powerful enough to do it real injury. Those whose efforts are less effective, though in the wrong direction, are usually let off more easily by being banished or incarcerated for a while, perhaps for life.

The wrongdoer can often make out a pretty good case for himself. The group may have deprived him of something that he wants; he may have tried to get it by accepted methods and failed. Frustration, as previously pointed out, frequently leads to socially undesirable responses which are so stereotyped that laws and statutes have been drawn up to deal with people who employ them. If the dissenter is a member of an opposition group, if he belongs to a powerful organization, he cannot be so easily punished; group or class conflicts are then likely to break out that may be decided by the courts, by an election, by arbitration, or by force.

Social Control. Confronted with the manifold local, state, and national laws and the network of conventional, social, and fiscal regulations to which civilized groups have subjected themselves, one can understand the man who reportedly lived on an island in the Gulf of Mexico and who, when he was asked what country the island belonged to, said that it didn't belong to any country; it belonged to him! Individuals have long sought lands where there would be nobody to tell them what to do, and where they could do as they pleased. The revolt from external control, however, usually results in the setting-up of some new system which may not be any improvement over the old.

The relative importance of the individual and the state has been debated by political philosophers, argued in courts of law, and fought out on bloody battlefields for generations. The laissez-faire policy seems

most attractive to the individual but it usually results in extra-legal forms of control which are far from satisfactory. The tyranny, absolute monarchy, or dictatorship may seem to provide excellent machinery for a time, but they stimulate revolt. Between these two extremes is the wide area of democratic control which leaves the way open for modification and remodification from within. It should be clear that a recognition of the principles of control are significant, educationally, in order that pupils may obtain a better understanding of the complexities of their own social organizations—political, economic, religious, or educational—both in school and after. It is significant, too, as a basis for deciding the type of class and school organization that will be set up to give young people the best possible opportunity to understand the problems involved in running a democratic state.

Whatever the form of education, however, the means of social control are found to be the same. They may be classed as external compulsion, re-education, and education. *Compulsion* may involve the use of armies, police power, exile, prisons, penitentiaries (homes for the penitent!), and concentration camps. Two principles operate: protection and retribution. The malefactor is forcefully segregated for the protection of society, or he is punished for his misdeeds. Retribution may be viewed either as moral justice or as sadistic lust. Judged in terms of consequences, retribution, which is a finer sounding word than retaliation or revenge, may seem to be temporarily effective, but it is likely to promote violent antagonisms that increase rather than reduce the spirit of revolt. Punishment may serve as a deterrent when it is a part of a conditioning process in learning socially acceptable ways of behaving, but only if it is not so excessive as to motivate further revolt and counter-retaliation. The child in school, like the convicted criminal, may be made to submit, but he is quite apt to rationalize his behavior by placing the blame elsewhere, decide that everyone is against him, and bide his time to continue his antisocial conduct.

The second form of social control is *re-education*. Like the use of force and detention, and often employing them, it comes after the undesirable act has been committed, and yet, unlike them, it seeks definitely to correct the condition that makes its use necessary. In this category are found all manner of reformatories, detention homes, houses of correction, and training schools. In these, to the extent that they are not punitive institutions in disguise, the effort is made to make up for the deficiencies of early training and the past errors of society, and to work out a plan of life with the individual that will enable him to participate in the larger and more complex social structure outside the institution.

Possibly the greatest contribution of Alfred Adler was not his theory of inferiority, but his emphasis on the necessity of re-educating the mal-adjusted individual by helping him to find positive rather than negative ways to satisfy his needs.

Such activities merge with the third form of social control, *education*, which serves to prevent the occurrence of undesirable behavior, and operates through a structured environment and through instruction. The schools are protective institutions of reduced complexity with a simplified system of social interrelationships that serve to keep the immature out of trouble. It should be added that control through a structured social environment is not for the immature alone, but for others as well. Working hours, family groups, workers' associations of various sorts, and political and social regulations within the community all serve a similar purpose. The individual becomes a part of an organized set-up with his own rôle assigned to him that involves definite responsibilities. As previously explained, the lines of responsibility may extend between worker and boss, or pupil and teacher, in an autocratic pattern, or they may connect the individuals of the group in a more complex network of obligations according to democratic principles. The latter encourage the individual to make his own wise choices with a minimum of forbidding and requiring by others. The result is self-discipline, which takes time to acquire. And its acquisition demands an environment in which there is an opportunity for the expression of a reasonable amount of individuality and initiative together with a willingness to conform where conformity is necessary.

3. Individual Differences in Social Learning

Human Nature. Judgments characterizing the human race throughout the ages have ranged from bitter castigation to ecstatic laudation. "Human nature is a ghastly thing," says one, while another avers that man is "but little lower than the angels." Observers from time immemorial have viewed with alarm and pointed with pride, but they have spent less effort on the attempt to comprehend and describe it verbally, much less quantitatively, in any systematic fashion. In recent years, psychologists have turned their attention to the problems involved in the analysis and delineation of human nature, problems which are of utmost importance to education. The enormous personality differences among children demand different kinds of educational experiences and different kinds of treatment, and they are particularly important in developing desirable attitudes and responses toward other people. Some of the work that has been done and some of the conclusions arrived

at will be described under four headings—types, traits, character, and personality. Much that has been discussed earlier, however, in connection with growth, intelligence, interests, attitudes, and "abnormal" behavior is directly pertinent.

Types. Sometimes a single characteristic of an individual is so outstanding that it influences almost everything he says and does. Since literature began, character sketches have been written to the delight of readers and also, no doubt, to the satisfaction of writers who find in a single dominant trait the unity that the art demands. Though he was not without Hebrew and Greek precursors, Theophrastus (c. 372–287 B.C.), a pupil of Aristotle, was the pioneer in literary characterology, with his word portraits of the flatterer, the offensive man, and more than a score of others.[5] His followers, like his characters, are to be found even today, though the latter are more likely to be portrayed in fictional or dramatic patterns. True, the characteristics of the familiar types often overlap, and therefore various efforts have been made to classify the kinds of people in the world more systematically and logically.

Probably no psychologizing is more popular than the offhand division of people into types. Dichotomies are common. Some one has said that there are two kinds of people in the world: those who divide the world into two kinds of people and those who do not. Spengler, for example, in his comprehensive picture of the decline of Western civilization, has made much of the masculine and feminine division, which is probably older than any other. Similarly, and more or less closely allied, are the emotional and intellectual types, the sensory and the motor, the thinker and the doer, the Jewish and the Aryan, the long heads and the broad heads, the blondes and brunettes, the Nordic and the Mediterranean, the bromides and sulphites, the tender-minded and tough-minded, the introvert and extrovert, and pyknic and asthenic.

The chief difficulty that the dichotomists have is in making the infinite varieties of human personality fit into their twofold classification. Thus Kretschmer includes between his stout pyknic and his slender asthenic his mid-type or "athletic" and his miscellaneous "dysplastic" group; and Jung, it will be recalled, made much of certain subtypes of his introvert and extrovert, while others have employed the term "ambivert" for the middle range of the distribution. If a single-line characteristic is considered, such as introversion-extroversion, the measurements indicate that one does not find the world divided into types at all. Instead, there seems to be a distribution approaching the normal curve, which was found in

[5] A. A. Roback, *The Psychology of Character*, New York: Harcourt, 1927.

the case of intelligence and of achievement in school subjects, with a few persons at the ends of the distribution who may be considered as representing the "types," but with the great mass of people somewhere in between.

Another difficulty with some of the dichotomies is that the two types are not true opposites. They do not designate the persons with a great deal and with little or none of a certain characteristic, respectively. Intelligent—feebleminded represents a correct dichotomy, while social-antisocial does not. The true antonym to social would be nonsocial or seclusive.

But type classification is not necessarily dichotomistic. For example, children used to be classified according to their predominating sensory imagery as audiles, visiles, tactiles, etc., though it was later found that relatively few seem to conform to the type categories. Types have been delineated on the basis of different approaches:[6]

According to temperamental characteristics: e.g., sanguine, choleric, melancholic, phlegmatic (classical temperaments); motive, vital, mental (Wells).

According to interests and character: e.g., economic, religious, esthetic, theoretical, social, political (Spranger); oral and analerotic (Freud); the "being" man, the easy-going man, the striving man (Dessoir); emotionally mature and emotionally immature (Willoughby).

According to abilities: e.g., imagery types; sensory and motor types; types of mental defect and of genius.

According to disposition: e.g., sex types (Apfelbach); extrovert-introvert (Jung); cyclothyme-schizothyme (Kretschmer); eidetic types (Jaensch); hormone types; cerebrotonic, viscerotonic, somatotonic (Sheldon).

According to disintegration and disease process: e.g., psychotic and neurotic syndromes.

Some of these type categories have been mentioned in other parts of this volume. The practical value of most of them educationally is still somewhat dubious.

The term *syndrome* has long been used in medicine to apply to a combination of clinical symptoms that occur together and characterize a disease. Similarly, a combination of characteristics may characterize a personality type which may indicate mental illness or maladjustment.

[6] R. B. Cattell, *Description and Measurement of Personality,* Yonkers-on-Hudson: World Book Co. Copyright 1946. Abbreviated from pp. 21–23, by permission.

The psychiatric influence has been strong in the study of behavior mechanisms during recent years with the result that parallels are noted between aberrant and so-called normal behavior. This influence is clearly noted in the Kretschmer and also in the Sheldon classifications (Chapter V). The following types of syndromes illustrate this trend and also serve to differentiate some of the behavior patterns of concern to teachers.[7] Except for the brain-injured child, there is no known physiological condition producing the traits described.

1. *Unsocialized aggressive:* disturbing element in school, violent, quarrelsome, has assaultive tendencies, fights, cruel, defiant of authority. Malicious, inadequate, has guilt feelings. Selfish, "incorrigible," boastful, vengeful, deceitful, blames others, suspicious, profane, obscene in language, preoccupied with sex. If a girl: has temper tantrums, disobedient, rude, unpopular, egocentric, changeable, "spoiled child" actually rejected by hostile world.

2. *Socialized delinquent:* pseudosocial, steals with others, furtive, habitual delinquent, stays out late at night, deserts home, has bad companions, takes part in gang activities, truant from home, has police record, has habits of smoking, loitering, lying. If a girl: sex delinquent, overinterest in boys.

3. *Overinhibited child:* seclusive, shy, apathetic, worries, sensitive, submissive, daydreams, feels inferior, lacks close friends, cries easily, overdependent, easily depressed, discouraged with himself. Physical complaints, neurotic illness, insecure.

4. *Schizoid child:* absent-minded, "queer," erratic, seclusive, listless, inefficient, careless, forgetful, daydreaming, lack of initiative and ambition. In girls: changeable moods, depressed, daydreams, inefficient, careless, emotionally unstable, lacks concentration, has fantastic thoughts, regresses toward infancy. Likely to have perfectionist mother or parents disappointed in sex relationships.

5. *Encephalitic or brain-injured child:* personality change from a specific time or episode; irritable, has changeable moods, "queer," emotionally unstable, contrary, nervous, has irregular sleep habits. If a girl: restless, distractible, violent, has temper tantrums, a disturbing influence in school.

While it is well to note such syndromes when they occur, in most cases it is probable that the observed behavior is the definite result of the kind of treatment, the frustrations, the child has encountered, and the lack of intelligent construction in social relationships. When the

[7] R. L. Jenkins and Sylvia Glickman, "Common Syndromes in Child Psychiatry," *American Journal of Orthopsychiatry*, vol. 16 (April, 1946), 244–261.

cases have progressed this far, remedial work is most difficult, and calls for expert psychological assistance.

Traits. The kind of response an individual will make in a social situation depends in part, of course, on his general intelligence. But it also depends in very large measure on the kind of person he is. Some responses will be more difficult for one to acquire than they will for another. The various patterns of response that can be recognized are each referred to as the expression of a trait. A trait is an individual's general manner of behaving or mode of adjustment in certain kinds of situations. Its origins are obscure. It may be thought of as made up of a number of habits; or it may even be viewed as having no real existence in the organization of behavior of the individual, being instead a perceptual pattern of the observer that goes into the forming of his concept of the trait. On the other hand, it seems more probable that traits constitute organized modes of behavior within the individual. If this view is accepted, the trait or pattern of traits becomes the whole out of which the various dispositions to respond to specific situations are individuated; the responses may then become habitual and automatized. Thus in the example previously employed, courtesy is a trait that finds expression in various ways as the child grows up. It may be motivational in its effect, leading the individual out of his way to perform courteous acts.

It is the trait that forces the formation of new habits, congenial and serviceable to the trait. . . . A wide range of equivalent stimuli arouse it. Furthermore, its structure has changed with time; for not only has it become a pervading style of behavior but also a motivational system basic in the structure of the personality. The trait has become autonomous.[8]

Allport's definition of a trait is "a generalized and focalized neuropsychic system (peculiar to the individual), with the capacity to render many stimuli functionally equivalent, and to initiate and guide consistent (equivalent) forms of adaptive and expressive behavior." Psychologists have only begun to isolate and study these systems, and they are far behind the offerings of the English language, in which approximately 18,000 terms (chiefly adjectives) designate distinctive and personal forms of behavior.

The trait names have been classified in four columns.[9]

[8] G. W. Allport, *Personality: A Psychological Interpretation*, New York: Holt, 1937, pp. 292–293.

[9] G. W. Allport, *op. cit.*, pp. 303–304. Also G. W. Allport and H. S. Odbert, "Trait Names: A Psycholexical Study," *Psychological Monographs*, No. 211, 1936.

Column I contains "those names that symbolize most clearly 'real' traits of personality." They designate generalized and personalized determining tendencies—consistent and stable modes of an individual's adjustment to his environment. Included are such common terms as "aggressive," "introverted," and "sociable," and also less familiar ones like "avid" and "atrabilious."

Column II contains "terms descriptive of present activity, temporary states of mind, and mood." Included are "abashed," "rejoicing," and "frantic."

Column III contains characterial evaluations. They involve social judgments or value-estimates and do not symbolize psychological dispositions, though these are implied. Such terms are "insignificant," "acceptable," and "irritating." It is clear that the names in this column apply to the social-stimulus value of the personality.

The items in Column IV are classed as miscellaneous.

Since the traits of an individual are distinctly his own, their investigation has been left largely to clinical methods of approach. However, it may have been noted that in the definition of trait, the phrase "peculiar to the individual" was set off by parentheses. This was to point out that what is universal in human personality can be and has been explored. The term *common trait* has been employed to refer to "those aspects of personality in respect to which most mature people within a given culture can be compared."[10] Here lie those lists of so-called traits which are used so frequently in rating scales, and which represent "a certain common aspect of true individual traits."

Some common traits have been investigated by other than rating techniques. The most frequently used procedure is to use a questionnaire modeled after the Woodworth *Personal Data Sheet*. Those who fill it out are expected to answer "yes" or "no" or "?" (I don't know, can't say) to such questions as the following:

> Are you often frightened in the middle of the night?
> Are you bothered much by blushing?
> Do people find fault with you more than you deserve?
> Do you have great fear of fire?
> Did you ever have a nervous breakdown?

A number of inventories based on such questions as these have been developed, some of them employing a multiple-scoring procedure that is supposed to isolate different common traits. Among these is the *Bernreuter Personality Inventory*, which is scored for neurotic tend-

[10] G. W. Allport, *op. cit.*, p. 300.

ency, self-sufficiency, introversion-extroversion, dominance-submission, confidence in oneself, and sociability.[11] Another, the *Bell Adjustment Inventory*, arranged in two forms for students (Grades 9–12) and for adults, aims to measure by a similar method what the author calls home adjustment, health adjustment, social adjustment, and emotional adjustment, and (on the adult form) occupational adjustment.[12] Reliability coefficients range from .81 to .91. A third, the *California Test of Personality*, is still more detailed.[13] It is adapted to two levels, Grades 4–9, and 9–14, and divides into two parts, self-adjustment (what has here been referred to as integration), and social adjustment. The subdivisions on the first part are self-reliance, sense of personal worth, sense of personal freedom, feeling of belonging, withdrawal tendencies, and nervous symptoms. On the second part the subdivisions are social standards, social skills, antisocial tendencies, family relations, school relations, and community relations. The reliabilities of these parts are quoted as ranging from .60 to .87.

Another self-inventory is scored five ways for social introversion-extroversion, thinking introversion-extroversion, depression (cheerful-depressed), rathymia (impulsive-inhibited), and cycloid disposition (stable-fluctuating mood).[14] A companion inventory is scored for five other traits: general activity (vigorous-inert), ascendance-submission, masculinity-femininity, inferiority feelings, and nervousness (calm-irritable).

A more detailed procedure describes the situations in which the individual taking the test may imagine himself acting. An example of this form is the *A–S Reaction Study*, a test of the bi-polar, common trait of ascendance-submission, defined as "the disposition of an individual to dominate his fellows (or be dominated by them) in various face-to-face situations."[15] Samples of the situations presented are the following:

A salesman takes manifest trouble to show you a quantity of merchandise; you are not entirely suited; do you find it difficult to say "No"?

> yes, as a rule ....
> sometimes ....
> no ....

[11] R. G. Bernreuter, *The Personality Inventory*, Stanford University: Stanford University Press, 1935.

[12] H. M. Bell, *The Adjustment Inventory*, Stanford University: Stanford University Press, 1934, 1938.

[13] E. W. Tiegs, W. W. Clark, and L. P. Thorpe, *California Test of Personality*, Los Angeles: California Test Bureau, 1939.

[14] J. P. Guilford, "An Inventory of Factors STDCR," 1940; The Guilford-Martin "Inventory of Factors GAMIN." Beverly Hills: Sheridan Supply Co., 1943.

[15] G. W. Allport and F. H. Allport, Boston: Houghton Mifflin, 1928.

Some one tries to push ahead of you in line. You have been waiting for some time, and can't wait much longer. Suppose the intruder is the same sex as yourself, do you usually

> remonstrate with the intruder ....
> "look daggers" at the intruder or make clearly
>   audible comments to your neighbor.........
> decide not to wait, and go away ....
> do nothing ....

When you were 10 or 12 years of age were you the "goat" for your playmates? (e.g., in playing war would they force you to fight on the unpopular side?)

> usually, yes ....
> occasionally ....
> never ....

Validity of Trait Measurement. The besetting weakness of all trait inventories and personality and character tests is their uncertain validity. There is no real assurance that they measure the traits they are supposed to measure or anything else, since the setting-up of a criterion with which the results can be compared is a virtual impossibility. The two chief techniques have involved the use of ratings, made by those who supposedly know the persons tested and the meaning of the trait, and the use of the complicated factor analysis technique. The latter sometimes comes out with "traits" which may exist, though they are not recognizable, and the results are at least partly dependent on the procedures the experimenter employs to obtain them.

Some of the reasons for the uncertainty about the validity of trait measurement and for the difficulties in the interpretation of the results may be mentioned. The first lies in the danger of the existence of a *sampling* error. Such a general trait as "ascendance-submission" may also be classed as an attitude toward society; but, viewed as a common trait, it implies that in certain situations most people meet with opportunities to respond in an ascendant or submissive manner. The frequency with which an individual would respond in this way is taken as a measure of the probability that he would respond in the same way to other situations not described on the test folder. This, however, is an assumption.

The second difficulty resides in the transfer from an *artificial situation* to a real one, from a paper-and-pencil test to overt behavior. The testee may malinger by answering the questions in a way that he thinks will get him a more favorable score. Even though he answers them as hon-

estly as he knows how, he might actually and under provocation behave in a manner quite different from the way he indicates on the test that he would behave.

The third difficulty, not entirely separate from the other two, relates to the problem of *trait-consistency*. Traits are to some extent independent of each other but they are also interrelated. And two situations which supposedly might call out the same trait response may arouse different ones; for example, a person may be neat in his personal appearance, but his room may be a mess. Such contradictions can sometimes be explained in terms of some more general trait—personal vanity, perhaps, in this case.

The fourth difficulty arises from the nature of the *distribution* of common traits. To the extent that the trait measured varies according to chance as a consequence of multiple causes, as in biological growth, the resulting distribution will, of course, follow the normal probability curve. But when other factors such as regulations or prohibitions are present, the distribution is likely to be sharply skewed, or to take the form of the so-called J-curve which represents a piling-up at one end of the majority of cases that follow the regulation, and a tapering-off in the number of those who disregard it. If the trait being measured is one which implies conformity to a code of some sort, as is the case with many of the traits deemed important, such as sociability, citizenship, honesty, and the like, a normal distribution might not be found; and hence the statistical measures that assume a normal distribution could not be used.

The most detailed study of traits yet made employs the factor analysis technique and holds much promise for the future. Twelve so-called "primary source traits" have been tentatively derived.[16] They are presented in their bi-polar form below, each with its opposite, and followed by verbal designations of statistically derived component characteristics that serve to describe the trait:

A. *Cyclothymia* v. *Schizothymia*
     Outgoing, idealistic, cooperative; good-natured, easy-going v. anti-social, schizoid; surly, hard.

B. *Intelligence, General Mental Capacity* v. *Mental Defect*
     Intelligent, analytical; strong-willed, conscientious v. unimaginative, stupid; indolent, incoherent, impulsive.

[16] R. B. Cattell, *op. cit.*, pp. 313–337. Only the first two of the five to seven descriptive clusters for each primary trait are given here. Those toward the end of the list are less clearly established. Quoted by permission.

C. *Emotionally Mature Stable Character* v. *Demoralized General Emotionality*

    Realistic, facing life; stable, integrated v. demoralized, autistic; changeable, characterless, unrealistic.

D. *Hypersensitive, Infantile, Sthenic Emotionality* v. *Phlegmatic Frustration Tolerance*

    Infantile, demanding, self-centered; restlessly, sthenically hypomanically emotional v. emotionally mature, adjusting to frustration; calm, self-effacing, patient.

E. *Dominance (Hypomania)* v. *Submissiveness*

    Self-assertive; willful, egoistic, predatory v. self-submissive; mild, self-effacing, tolerant.

F. *Surgency* v. *Agitated, Melancholic Desurgency*

    Cheerful, enthusiastic, witty; optimistic v. unhappy, frustrated, dour; melancholic (agitated, involutional).

G. *Positive Character Integration* v. *Immature Dependent Character*

    Wise, mature, polished; strong-willed, conscientious v. dependent, silly, incoherent; indolent, impulsive.

H. *Charitable, Adventurous Cyclothymia* v. *Obstructive, Withdrawn Schizothymia*

    Kindly, gentle, idealistic; outgoing, cooperative v. hard, cynical; anti-social, schizoid.

I. *Sensitive, Imaginative, Anxious Emotionality* v. *Rigid, Tough, Poise*

    Kindly, gentle, idealistic; imaginative, introspective, constructive v. hard, cynical; set, smug, thrifty.

J. *Neurasthenia* v. *Vigorous "Obsessional Determined" Character*

    Indolent, incoherent, impulsive; simple-hearted, meek v. strong-willed, conscientious; smart, assertive.

K. *Trained, Socialized, Cultured Mind* v. *Boorishness*

    Intellectual; strong-willed, conscientious v. simple undisciplined mind; indolent, incoherent, impulsive.

L. *Surgent Cyclothymia* v. *Paranoia*

    Cheerful, enthusiastic, witty; good-natured, easy-going v. unhappy, frustrated, dour; surly, hard.

Character. Like other words taken over from common speech, the word character means too many things to be satisfactory as a technical term. Words with more than one meaning are known as *homonyms.* The meanings of most homonyms can be distinguished by spelling

(e.g., see, sea), pronunciation (e.g., refuse'—to decline, ref'use—garbage), or by context (e.g., band—a belt, band—a musical organization). But some homonyms have meanings that are so much alike that they are often confused (e.g., ideal—perfect of its type, ideal—desirable). Character is one of these.

In general, the word has a moralistic flavor, like "being good," and is commonly used in such phrases as "character-building agencies" to apply to organizations providing a combination of religiously toned recreational activities. Or the word may mean merely honesty, or outward conformity. In any case, it applies to a number of vaguely defined traits that go to make up the total personality.

For purposes of clarification, two meanings and a third that is a combination of the two will be differentiated. The first is *volitional perseveration*. An individual who carries through a line of endeavor with determination, swerving neither to the right nor the left, taking punishment, and fighting against odds, is said to have character. This is the meaning given the term when character is defined as "an enduring psychophysical disposition to inhibit impulses in accordance with a regulative principle."[17] The negative view of character as inhibition has the positive implication of determined action. This is a valuable concept. However, although the ability to stand up to punishment, to refuse to be deterred, and to maintain one's convictions against all opposition may be commendable at times, such behavior may also be characterized as pugnacious, stubborn, pig-headed, stupid, or just plain "ornery"! It would include evil but persevering men among those with strong character. Psychologically, this is quite permissible, the nature of the "regulative principle" being left to ethical judgment to determine its goodness or badness. Another statement of virtually the same meaning emphasizes the integrative aspects of personality. In this sense character "refers to the manner in which the drives are organized in relation to one another . . . a good integration of dynamic traits—i.e., perseverance and freedom from maladaptive impulsiveness—in relation to the attainment of those cultural goals which the individual has accepted, whether or not they are in his culture pattern."[18]

The second meaning of character relates to behavior in harmony with the cultural pattern, particularly the moral code of the group. In this sense, it can be defined as *behavior in accord with the mores*, which makes it practically synonymous with moral conduct. To the extent that there is agreement in a culture on a code that its members should

[17] A. A. Roback, *op. cit.*, p. 450.
[18] R. B. Cattell, *op. cit.*, p. 202.

follow, to that extent educators can employ psychological procedures to develop the desired behavior patterns in the children under their care. There is a large area of such agreement that merges with the general field of standards of correctness among the folkways, in which ethical considerations do not necessarily enter. It should be emphasized, however, that different groups accept different standards. This is as true for the rules of table etiquette as for the laws about property rights. Then, too, codes come into conflict not only over questions of form and of standards of conduct, but also over life values and ideals. In different cultures, different values are emphasized; and in the same culture, different groups extol different and conflicting values—intellectual, military, social, and so on.

Some writers bring the two meanings together to constitute a third. They hold that morality (the second definition) is mere conformity to existing standards, and should be distinguished from character, which is a more dynamic concept involving volitional factors (the first definition), and "individual creativeness in the realm of goals to be achieved."[19] This distinction is an interesting one, since it seems to derive from the factor of choice between an easier, accepted way and a way rendered more difficult by additional and perhaps new considerations. It might involve opposition to ways once considered good and supported by good people, and the following of different ways believed to be more in harmony with accepted ethical principles. Thus a "reformer" would have more character than a conformist, a heretic than an adherent, a true conscientious objector than a compliant draftee. This does not mean that one is better than the other, but merely that he has a "stronger" character when it is so defined. It is doubtful that many of the so-called character-building agencies would whole-heartedly favor this definition; they would probably prefer to accept a ready-made set of values (the second definition). It is important to keep these different meanings of character in mind, for careless usage is likely to result in confusion. For example, it may take more character (the third definition) for a child to organize a revolt against the unfair and overbearing rule of an autocratic teacher than to submit, but such a child would probably be called a trouble-maker by a teacher, and be punished by a principal, both of whom believe that the school should develop children's "character."

Personality. The word personality has been reserved for consideration until a number of more or less closely related terms that are often con-

[19] Vernon Jones, "Character Development in Children," Chapter 14 in L. Carmichael's *Manual of Child Psychology*, New York: Wiley, 1946.

fused with it have been discussed. It is a very complex and abstract concept in spite of the fact that it is generally so glibly used. It is another one of the homonyms, meaning often quite different things which are enough alike to be easily confused. Allport has enumerated and discussed some fifty different meanings.[20] In view of the frequent use of the word in educational groups in connection with the qualities of the good teacher, and also with the objectives of education in promoting pupil development, it might be worth while to consider all fifty. But only the two meanings previously mentioned (Chapter II) will be distinguished here. Many of the others are fairly clear from the context.

The first definition, the one most commonly used, is the pattern of a person's responses as they affect other people. This is referred to as *stimulus value*. Thus an individual's personality may be good or poor according to the likes and dislikes of those about him. In this sense, efforts may be made to "improve" his personality by encouraging him to be more or less talkative, cheerful, disputatious, critical, and so on. Desirable as such objectives may often be, it becomes at once clear that the "good" or "poor" as applied to his personality have meaning only in relation to the groups concerned, and for the circumscribed range of situations within which he is being judged. A hale and hearty person who is always cheerful and talkative may be thought to have a charming personality in one group, and be considered an unmitigated bore in another. Or he may have a fine "selling personality," but be a nuisance in a shop or an office.

In spite of the varied judgments of different groups, however, it can be argued that certain personal characteristics are generally received with favor while others are generally unacceptable. A number of popularly written volumes have appeared which profess to help people improve their personalities, which seems to mean their social acceptability or social influence. There is some question whether an adult can learn to be socially acceptable out of a book, any more than he can learn to swim or to speak French in the same way. Undoubtedly, he can learn something, but it would have been better if he had begun earlier and had the benefit of instruction. In a homogeneous social group, social habits are acquired at home under the tutelage of parents, but when parents have been negligent, or have inculcated social behavior patterns that are acceptable to their group but not to the one into which their offspring may have climbed, it may be possible to make up some of the deficiencies. Since wide samplings of all kinds of children are found in the schools, personality defects, if not too severe, are sometimes cor-

[20] G. W. Allport, *op. cit.*

rected by the direct or indirect influence of fellow pupils. In many cases, however, children feel that nobody likes them, or at least that they don't have many friends; and, though they may have checked on body odor and unpleasant breath, they are still not popular! They need help in social adjustment.

The various aspects of personality, defined as the effect one has on others are revealed in an inventory which results in a score that is called the personality quotient or PQ.[21] In the *Manual*, under the head "Definition of Personality," there appears this statement: "Personality is measured by the extent to which the individual has learned to convert his energies into habits and skills which *interest* and *serve* other people." Questions on the inventory blank call for the checking of interests in games, studies, group activities, and hobbies, and for a yes, no, or don't know answer to questions on habitual, social, and emotional conduct. The inventory claims to measure five personality traits: "extroversion, social aggressiveness, self-determination, economic self-determination, adjustment to the opposite sex." While the reliability and especially the validity of the instrument are open to some question, the plan is consistent in its effort to get at individual problems of social adaptability and adjustment.

Although it may be convenient to think of personality as the effect of an individual on others, it would be advantageous if this meaning had another popular term to designate it. Social acceptability, social influence, and personal stimulus value have all been employed. This would leave personality to apply to its other chief meaning.

As defined by Allport, "personality is the dynamic organization within the individual of those psychophysical systems that determine his unique adjustments to his environment." Defined in this way, an individual's personality is what it is whatever other people think of it—whether they like it or not. Personality in this sense is not just good or poor with respect to a small or large group or in relation to a certain kind of situation. The definition leaves the way open for the investigation and description of the nature of the psychophysical systems, of their organization, and of the adjustments made to the physical and social environment.

From this point of view it is possible to distinguish some of the components of personality that have already been discussed and that are sometimes confused with it. One of these components is *intelligence*.

[21] H. C. Link, *Inventory of Interests and Activities*, New York: Psychological Corporation, 1938.

It may readily be seen that, while a bright person would have more complexly organized "psychophysical systems that determine his unique adjustments to his environment" than a stupid person, his intelligence is not his personality.

Another component of personality is *temperament*. However, it may be categorized, whether in the classical terminology, or in that of Kretschmer or Sheldon, or anyone else, the quickness, lability, and intensity of emotional response is a significant factor in the total personality make-up.

Similarly the *interest* pattern of the individual, the classes of things he tends to move toward, manipulate, stay in the presence of, think about, and participate and take pleasure in, serve in part to characterize his "unique adjustments to his environment."

Closely related is his pattern of *attitudes*, those acquired sets to respond to certain classes of persons and objects and the relationships between them in certain ways. The individual tends to carry forward his activities in harmony with certain more or less conventionalized directional systems of implicit or overt behavior.

Fundamental to interest and attitude is the factor of *habit*. Certain groups of things that an individual habitually does are a part of his personality, those "systems that determine his unique adjustment," whether they are as specific as the conventionalized responses demanded by proper etiquette, or the more generalized habit of courtesy. Dewey described this kind of response, that has been called a *generalized habit*, as follows:

The essence of habit is acquired predisposition to ways and modes of response, not to particular acts, except as, under special conditions, these express a way of behaving. Habit means special sensitiveness or accessibility to certain classes of stimuli, standing predilections or aversions, rather than the bare recurrence of specific acts.[22]

A generalized habit thus becomes more like an attitude or a trait.

Still another component of personality is the *trait*, which we have seen is a response system that may be distinguished, tends to be frequently repeated, and, in relation to other such patterns, is often characteristic of the behavior of a person.

Type is more inclusive than trait and is properly a delineation of the "organization of response systems" that characterize an individual,

[22] John Dewey, *Human Nature and Conduct*, New York: Holt, 1922, p. 42.

though the effort to identify a small number of types within which large numbers of persons may be categorized has to date not been too successful.

Lastly, *character* is a somewhat loosely defined component of personality, implying certain volitional or ethical factors, or both, and subject to group value judgments of strong or weak, good or bad.

It may readily be seen that the meaning of personality is a high-level abstraction in that it is drawn from general concepts (traits and subtraits) which in turn refer to specific acts in different environmental settings. Personality is not a "sum total" of anything, though it is often so defined. It is a complex pattern of perceived characteristics. True, one learns to deal with different kinds of personalities, but he does so in particular situations. If one is to learn to respond correctly in social situations, he must learn to identify them, as we have seen he must do in verbal, numerical, athletic, and esthetic situations. The patterns are much more complex, hence the task is more difficult, and errors are more likely to occur.

4. Perceiving Social Situations

Social Relationships. The learning process, so far as the individual is concerned, is the same in the social environment as it is in any other, but the stimuli are the words and acts of other people, and the responses are judged in terms of their harmony with social expectations, demands, and regulations. The individual must find his way about among others of his kind, just as he must among the objects and forces of his objective environment. He must learn to satisfy his primary and secondary needs, in spite of others, or with their cooperation, as the case may be.

He has dealings with other people as individuals or groups in more or less clearly defined relationships that may be referred to as the cultural pattern, or, perhaps better, as the social structure. The social structure consists of laws, rules, arrangements, understandings, accepted ways of speaking and acting—in short, the folkways and mores of the land. The process of learning what these are is a long and painful one, partly because they vary in slight but important ways from group to group, and partly because the individual drives often seem so much stronger than the regulative barriers—until one acts on this supposition, when he learns that society is ruthless in its power to frustrate the individual, and, if he persists, to crush him utterly.

Prepotency. It was earlier pointed out that a person tends to perceive and hence to respond to a total situation on the basis of what stands out

prominently, including such characteristics as size, intensity, motion, and the like, while other less noticeable factors, but perhaps quite as important, tend to be neglected, unless one is on the lookout for them. In social situations, similar factors operate. Children who are noisy or moving around probably get more than their share of attention. But in addition, certain physical, racial, or cultural characteristics that are easily identifiable serve as prepotent stimuli to the behavior of others. These conditions constitute a sort of *badge* which stands out so clearly that other and perhaps more important characteristics tend to be disregarded.

For example, a crippled child or one who is otherwise deformed or handicapped may be either ridiculed so that he becomes timorous or coldly resentful, or he may be given more consideration than is good for him, so that he becomes overbearing and domineering. While the "badge" should be noted, other characteristics—those which he shares in a comparable degree with others—though not so noticeable, can more properly be observed and reacted to.

Similarly, people of other races stand out, particularly when there are striking differences in hair and skin color. Of course, racial and nationality prejudices are more than skin deep, but it is disconcerting not to know whether you dislike a person because you are not quite sure of his classification! The response to the color "badge" is sometimes most unfair, since other characteristics of the individual—his intelligence, his talents, his social and moral qualities or his lack of them—are much more significant.

Likewise, socio-economic, class, and cultural differences constitute a badge which may or may not be of significance. The child who is better or more poorly dressed than the others in the group, is cleaner or dirtier, or whose English is purer or more vulgar is sure to be singled out for special attention by the others and perhaps by the teacher. It sometimes takes a teacher quite a while to realize that the school virtues and vices do not strictly follow class lines.

This factor of prepotency in social situations, this badge, determines the nature of the world to which the wearer must adjust himself. A person who wears one kind of badge and approaches a group will find it is one kind of group; a person with another kind of badge will find it a different kind. Instead of an easy adjustment to a friendly group he may have to make a difficult adjustment to an evasive and perhaps overtly unfriendly group. The task of the teacher who aims to aid in social learning, then, is a twofold one: He must help the wearer of the badge to make the difficult adjustments he will need to make; and he must teach the others to perceive and respond to the less potent but

more significant stimuli. Much more attention can well be given to the technique for doing these two things.

Not all badges make adjustment difficult. Indeed, some characteristics, such as a beautiful face or a powerful physique or a uniform, have the opposite effect of winning for their owners more credit and prestige than is their due in view of their other less noticeable characteristics. The prepotent stimulus is apt to be important, it may be deceptive, but right responses can be made only when other stimuli are also perceived as a part of the personality pattern.

The Developmental Dimension. In order to assure adequate social responses, the learner must be able to identify and take account of certain dimensions of the social scene. The first of these is the developmental dimension—the stage of development of the individuals concerned. This is fairly easy with extreme cases. Parents and teachers do not "expect as much" of the younger child as of the older. Even the small child behaves somewhat differently toward his baby brother, his older brother, his parents, and his grandparents, though he has to be helped to make and generalize the distinctions.

We customarily make fairly sharp age distinctions in judging children's abilities in motor skills and in verbal and numerical learning, but in social relationships they tend to be forgotten by older people, who sometimes quite wrongly apply mature standards of conduct to children. "I will not have a son who is a coward," or "Tom is irresponsible and untrustworthy," or "I just got the room cleaned up, and when I came back what do you suppose I found! Baby had pulled all the books off the shelves as high as he could reach and he was sitting there tearing out the pages. I spanked him good for that!" Such cases could be multiplied to illustrate the failure of adults in perceiving the nature of the developmental dimension. In such cases, children no more deserve punishment than they would for mistakes in spelling or arithmetic.

A variation of the developmental pattern should be briefly mentioned that is less closely allied to physical maturity. It relates to the kind of experience the individual has had. Just as a teacher would not expect much skill of a beginner in golf, or German, for example, whether he is ten, twenty, or thirty years old, so he should not expect high standards of social behavior from one who has lived among people with different standards. Yet those who come from an unfavorable social environment are more often regarded as "bad" than as beginners in the practice of virtue. Similarly, people who have never been taught self-control, whether they are twenty years old or fifty, cannot be expected to meet

crises without making a scene. Their so-called emotional immaturity is a direct consequence of their earlier training in which they got what they wanted by having a tantrum. It is necessary to take such people's stage of development into account, but teachers and parents may well work on the problem of reducing the number of older offenders by helping the young in their social development.

The Directional Dimension. Besides the stage of development, it is necessary in social situations to perceive the goal toward which the individual is striving. This is easily recognized when a child hits another accidentally, though it may be difficult to convince the victim that this was the case and to teach both the proper etiquette in such circumstances. The law quite properly recognizes provocation and looks for motives in dealing with crime. No act can be judged by itself without including in the picture what preceded, what the individual was trying to do. Thus the child who sticks pins into others or bullies smaller children is coming to be recognized as one who is likely to be insecure and is striving to gain attention or to satisfy his need for mastery, and not as just a bad boy to be punished. It often happens that wrong acts are performed by children for commendable reasons, but they are caught in a conflict of loyalties. Among such acts are helping a friend on an examination, lying about who broke the window, boasting about the family, fighting to protect a weaker pal, and so on. One needs to realize the nature of the behavior sequence before he can help children adequately to meet such situations, and before he can teach them to take the goal or directional dimension into account in dealing with their world.

The Interactional Dimension. Not only should the developmental stage and the goals of the learner be recognized, but the total situation in which he is operating must be adequately perceived. There are many cases in which a kind of behavior is appropriate in one place but not in another. For example, one can shout on the play ground but not in the library. But many situations are not so simple, as, for example, the subtle differences in the behavior expected of a guest and a host, or how a boy should act toward his own father when he takes a group on a trip, and to his friend's father when he does. Stories that are mildly amusing in one group are reprehensible in another, and what is a pleasantry to one's friends may be insulting to Auntie.

Children have to learn these differences in the structure of the field, but as a rule they get little systematic help. They are more likely merely to get jumped on when they make a mistake. The teacher who reprimands a pupil before the class may be guilty of neglect of the inter-

actional dimension, or one who similarly commends a pupil may in some circumstances be equally guilty. Cases have been reported of administrative officers who have reprimanded teachers in front of their classes, but such conduct is, let us hope, so infrequent as to be unworthy of mention. The delicate interrelationships that exist, and that determine what is appropriate to say or do when X is present, and the ways they differ from what is proper when Y is also present, or Z, or Y and Z, require considerable instruction, far more than pupils usually get. A career diplomat learns these things, but even he sometimes makes mistakes.

The Observational Dimension—the Frame of Reference. Whatever a person does may be judged in various ways in accordance with the background and point of view of the observer. The behavior of a child may be amusing, scandalous, intelligent, clever, stupid, normal, or unheard of, depending on who observes and reports it. One of the most important requirements in social perception, and one of the most difficult, is to recognize one's own point of view, to appreciate the nature of one's frame of reference. Those teachers who are middle-class people sometimes find it difficult to understand parents from the upper or the lower class. The individual brought up in a small fundamentalist community views many amusements differently from one who has lived a sociable life in a large city. The disciplinarian type of teacher may take a sterner view of a pupil's ingenuity than does his easy-going parent. It is natural to be somewhat partial to one's own view. But it is possible to hold to it, and at the same time to recognize that it is only one view and that there are others. It may even be possible to learn to correct for it, though too often this takes a good many years, and meanwhile generations of pupils have suffered and passed on. One teacher said, "I used to hold the pupils in line and make them toe the mark, but now I realize that I was often a bit severe." It is too bad that he and the thousands like him could not earlier have said to themselves: "I am the severe and exacting type, so my judgment may be too extreme in this case. I will therefore subtract three austerity units as a correction which will bring me more in line with the accepted policy of the school!"

Perceiving, in social situations, is largely seeing what isn't there. It is what is commonly known as getting the whole picture, which includes the developmental experience of the individual, the objective of his action, and the complex interrelationship of the immediate situation—all of these as viewed from a frame of reference the nature of which is clearly realized. When, in addition, prepotent stimuli are given no more

than their proper due, the learner is ready to learn what to *do* in response to the situation that is thus clearly perceived.

5. Learning the Correct Response

Precept—Direct Moral Instruction. A large part of the educative process consists in teaching pupils the answers. The teacher knows the answers, he knows how to read, write, multiply, translate, find the value of x, bowl, play the piano, and so on, and his task is to enable the pupils to do what he can do. The case of problem-solving, in which neither the teacher nor anyone else knows the answer, will be discussed in the next section. It may easily be assumed that in most of the social learning which children are expected to acquire the teacher also knows the answers, and his task, as in other situations, is to teach the pupils to do what he can do. There are various ways in which the task is performed. These may be classified as precept, example, directions, and practice.

Teaching by precept takes many forms. The word is here used in the sense of any verbal instruction intended as a rule of action or guide to conduct. The significant thing about it is that it is general, and hence applies to many people in many different situations. It is commonly found imbedded in inspirational talks, sermons, commencement orations, and the like. While the effectiveness of these media is difficult to measure, they are undoubtedly of considerable value in spite of the fact that the inspiration is more often felt by the speaker than by his possibly somewhat wearied juvenile audience, the members of which may not be impressed with what they are often impertinent enough to call "hot air," and who do not even know the meaning of many of the words used. In these forms, the appeal is apt to be somewhat emotional; and even when it is really "inspiring," the hiatus between the moments of emotional uplift and everyday living is well known. The effort should no doubt be made to determine what the actual effect of the inspirational address is; and, if it is found to be of value, those capable of employing its techniques effectively should be encouraged and the incapable ruthlessly silenced.

Precepts are also presented in *literature,* whether sacred or secular, when the purpose of the instruction is to derive a moral or to arrive at ethical generalizations as a guide to conduct. Such instruction has long been systematically employed in the Sunday Schools, where the experiences of the very human Biblical characters have served as a basis for moral lessons. The Orientals, from whom have been derived the greater part of the source material on conduct, have always been prone to

employ figurative language. The fables, as they appear in the *Panchatantra* or in Aesop, and the parables of the New Testament are illustrative of forms that are somewhat foreign to the Occidental modes of expression. Small wonder, then, that such writings have been argued and annotated, revised and readapted, that they may bring something approaching the original intent to the children and adults of our Western civilization.

However, it should be added that literary precepts may take on very mundane form, as in common proverbs or in the moral stories which appeared in the McGuffey readers that were so widely used in this country a generation or two ago, or in their precursors.

An example may be taken from *The Child's Guide Comprising Familiar Lessons Designed to Aid in Correct Reading, Spelling, Defining, Thinking, and Acting,* sixth edition, published in 1833.

Lesson IV tells the story of eight-year-old Charles who did not know how to read and write, and so his Aunt told Grace, the maid, to take him to school. After one day, he decided that he preferred to play with the cat at home. Grace said, "You must go," and took his hand. But he gave her a hard slap, and said, "No, I won't." But the next day Grace "came back with a great, tall, strong man" whom Charles "did not dare to strike, for he had a fierce look and a large stick," who carried Charles to school and "put him down on the floor like a bag of corn." Charles capitulated, and when he "had got so far that he could write and cipher, his aunt was so kind as to buy a horse for him to ride in the fields. . . . So he found it was well for him to do as his aunt wished to have him."

And there was five-year-old Ann, "who was good and kind to all," who gave a small bit of the cake her mother had given her to a "poor thin dog," and most of the rest of it to the dog's owner, "an old man who came out of a poor hut. . . . He, too, was thin, pale, and sick. . . . It was not long before Ann had another cake," and she "went to look for the old man and his dog, but could not find them; and she met a boy who told her that they were grown fat and well, and were gone to their own home a long way off."

Mention might also be made of the "Anecdotes of the Leopard," Lesson XXI, which contains this paragraph: "I have seen some children who, like the Leopard, were always ready to quarrel, or even to fight, when they could not have everything they wanted. Such children are much worse than Leopards, because these dumb beasts do not know good from evil, and therefore do not know that it is wrong to fight."

It was thus that the problems of motivation, poverty, and evil were solved for the young a century or more ago.

Sometimes instruction is carried on even more directly by means of various simplified *codes* which are either worked out in part by the children themselves or are imposed from without, but in such a way that conformity is considered desirable. Probably one of the best of these is the Boy Scout code, adapted for American use from Sir Baden Powell's English version. The various outdoor activities and the prestige of scoutmasters who are interested in boys both help to make the positive statements of the code effective. To say, "A scout is loyal," is far better than saying, "You ought to be loyal." The boys gradually gain a more complete understanding of the ethical terms employed, since the code forms a basis for a discussion of problem situations that arise. It can also help to build up a group morale and to create a spirit that is manly and wholesome without being sanctimonious or hypocritical. Other codes emphasize such virtues as self-control, kindness, sportsmanship, self-reliance, duty, reliability, truth, good workmanship, team work, and loyalty.

Several weaknesses and difficulties appear at once in the kind of direct instruction to be found in adult-sponsored groups employing preceptual material in the form of codes of conduct. The materials must be very well presented or they will be a bore, and their product either a set of scoffers or prigs. Organizations that work with school groups are apt to make mistakes that might easily be avoided if those in charge had a better understanding of child nature. In one community a certain "character-building" agency distributed a leaflet to high-school children that contained a statement of the various athletic and social activities it provided. But it began with this paragraph:

The purpose of the _____ is to create, maintain and extend Christian standards for personal living and school life. Activities are centered around contagious Christian service including talks and discussions on educational interests and personal problems.

As one perfectly normal high-school youngster got to this point, he exclaimed, "Oh, blah, blah!" and threw the sheet away.

More direct still is the instruction which takes the form of a *discussion of life problems*.[23] Here, if anywhere, the work stands or falls with the personality and skill of the teacher, who must be the kind of teacher who is also a leader, friend, and confidant; and the best instruction does

[23] See W. C. Trow, R. M. Zapf, and H. C. McKown, *The Junior Citizen Series:* "Getting Acquainted with Your School," "You and Your Friends," "Property," "Recreation and Leisure," "Looking toward a Vocation," "Meeting Difficulties," New York: McGraw-Hill, 1939, 1940. Rev. ed., 1950.

not seem to be compulsory, but is freely sought and grows out of actual experience and difficulties. What makes this work doubly difficult is that the questions that trouble children and young people the most are apt to center in their attitudes toward the opposite sex. And while much can be done to lessen the abysmal ignorance that is always a source of amazement, actual conduct is governed by such varying codes that a liberal attitude on the part of the teacher is likely to draw the fire of prudish vigilantes, while a more reactionary one will alienate the confidence of many young people in the worldly wisdom of the group leader. A middle ground looks like an evasion, and the homeroom period that is sometimes used for the discussion of various virtues may become either a bore or a fertile ground for the growth of smiling juvenile hypocrisy.

Imitation and Example. A vast amount of learning takes place without formal instruction. Children tend to imitate each other and their elders. So widespread is this response that theorists long assumed that imitation is an instinct. Careful study of imitative behavior, however, has revealed that it follows the pattern of learned responses.[24] The white rat that was rewarded by food when he followed one previously trained on a T-maze learned to imitate. Another, which was rewarded when he turned in the opposite direction at the junction, learned not to imitate. Children similarly learned imitation and non-imitation procedures in obtaining candy rewards. In both cases the learning was generalized to similar situations, and to similar kinds of leaders. The prestige factor turns out to reside in the kind of leader whose actions if copied bring the desired reward. The imitation response is gradually or rapidly extinguished if the imitated response is not rewarded.

It has been noted that the technique of instruction in which the teacher serves as a model to be imitated may not be very effective. This applies not only in the motor skills but in social learning as well. There are three chief reasons for this. One is that the response desired may not be summonable; the learner just can't do what he may know he is supposed to do. The second reason is that the learner can't distinguish which part of the activity of the model he is supposed to copy. It perhaps happens too quickly, or he sees only a part, not the whole action, so his copy is incomplete or superficial. And the third reason is that he sees what the model does but not the stimulus to which the model responded, and so, when the model is not present, he has no cue to which

[24] N. E. Miller and J. Dollard, *Social Learning and Imitation*, New Haven: Yale University Press, 1941.

he can respond. The first condition is a matter of previous learning; the other two involve perception and may be improved by verbal directions and pointing.

But, in any case, the response must be rewarded if it is to be learned. The desired behavior may be expected to continue for as long a time as the reward is forthcoming if it is of an extrinsic sort. If the response itself is satisfying it becomes its own reinforcement, like knowing what to say or do in a social situation and so avoiding embarrassment and maintaining self-esteem. If, on the other hand, the copied response doesn't work, if it "doesn't get you anywhere," or worse, if it is laughed at or objected to in the peer group, it will not last long, no matter how commendable it may be in the eyes of parent or teacher. Imitators, then, are those who have been rewarded for copying the acts of others. We cannot expect that a "good example" alone will produce moral behavior in the young, but we can expect that it will facilitate such learning, providing other conditions are satisfactory.

Instruction. In general, it may be said that those who seek to improve the social responses of younger people tend to fall into one of two opposing errors. They are likely either to be too general in their directions, expecting that generalized rules or precepts will enable the learner to meet the specific situations; or they are likely to be too specific in a negative way, saying "Don't do that," expecting that the learner will know what to do when similar situations recur. In symbolic and motor learning, teachers and others are perhaps more likely to recognize that the task is more complicated. We have seen that in these areas individual differences must be taken into account, that the learner must be able to perceive the situation, that the correct response must somehow be elicited and connected with the situation that calls for it, and that there must be opportunity for practice, in which the correct response is rewarded.

In social learning, the matter of individual differences has been discussed, as has that of perceiving social situations. We can now consider the factors of positive directions, practice, and reward.

The advantage of giving *positive directions* instead of negative ones can readily be appreciated. A world made up of don'ts is a baffling, frustrating sort of world, for it so frequently leaves the learner uncertain as to what he is to do. And interesting experiments have shown that positive directions are much more effective.[25] "Don't leave things lying

[25] M. Wilker Johnson, "Verbal Influences on Children's Behavior," *University of Michigan Monographs in Education,* No. 1, 1939.

around when you have finished with them," is much less effective than, "When we are finished, we pick up all the papers and put them in the wastebasket," or "A good workman puts his tools back where they belong when he is through with them." The definite suggestion opens up an acceptable line of action that is likely to be followed if there is no contrary suggestion of sufficient force to interfere. If, however, the directions are given after the closing bell rings, there will be definite contrary courses of action. Similarly, in most situations it is possible to shift the directions into their positive form: Instead of "Don't fight over the tricycle," one can say, "We take turns when we both want the same thing," and instead of "Don't be so noisy," "I wonder if we can't do it more quietly so as not to interfere with the others." In each case the direction relates to a definite kind of response and at the same time suggests similar desirable behavior for other situations.

But *practice* is necessary. Perfection is not as a rule attained in any form of learning by one satisfactory response. In other forms of learning this is assumed. With the best of intentions, errors recur and the teacher's task is to provide situations (examples, practice periods, etc.) where they can recur and by endless and often tiring repetitions to give the pupil the necessary experience so that the errors will gradually be reduced to a safe minimum. The variations of the situational pattern are so many, and the response pattern so complex, that it is doubly important to expect that learning will be slow, and to have at least as much patience with mistakes as one has in reading, and arithmetic, or in football and baseball.

It is by now a familiar rule that correct responses should be rewarded. But in the area of social learning, it so often happens that correct responses are punished and incorrect responses are rewarded. A child cries and yells and gets what he wants. A boy lies about what he did and is rewarded by not being punished. Another obeys the teacher and "tells on" a classmate and is commended by the teacher but ostracized or beaten up by the gang. A pupil misbehaves in class and is scolded by the teacher and perhaps sent out of the room. This may be a punishment, as the teacher thinks, or it may be a reward, for the pupil is getting some attention, which is a reward for him. Fulsome praise on the part of the teacher, on the other hand, may be intended as a reward, but, to the pupil, to be thus singled out may be extremely embarrassing, and hence a punishment which he will avoid in the future.

It may be concluded, then, that as in other learning situations the rewarded response tends to be repeated, and that it is important therefore to see that it is the desired response that is rewarded, and that what

is considered a reward by the teacher is in actuality a reward in the eyes of the learner.

6. Finding the Correct Response

Problem-Solving. In all fields, the experts know many of the correct answers. True, investigations often reveal that some of the things they know just aren't so! But most of them stand the test of time. The sum of 3 and 7, the meaning of *das Buch,* what the batter should do when he hits the ball, what to say when one greets an acquaintance—these and many less obvious "answers" are well known. But, similarly, in all fields there are problems, situations in which no one knows the answers, though some people are better informed than others on the ways of finding a solution to their difficulties. The processes involved in problem-solving have been discussed earlier and need not be reviewed here in detail. In the area of social learning, the significant element is the attempt to predict what the consequences of a particular response would be if it were made. What would be the result if I did this or that? Such a question requires considerable knowledge of the customary behavior of the people concerned; and it often happens that whatever one can think of to do would seemingly result in unfortunate consequences! This applies, of course, not only to pupils but to teachers and others as well.

There is one definite advantage, however, to be derived from accepting the problem-solving view. It tends to cause an individual to be less complacent about his responses. Instead of viewing the mess he gets into as the fault of others, he may come to the realization that the error was his, and seek to avoid it on later occasions.

In dealing with inanimate materials, as in shopwork, when things go wrong the worker is forced to the conclusion that the error must be his. If the tools are dull, he should have sharpened them; if the product is unsatisfactory, he cannot rationally blame the materials. Instead, he is forced to realize that his own skill is deficient and must be improved. But one who is working with people is constantly tempted to blame them if the outcome is not what is desired.

For example, the quantities of good advice in the form of precepts, as well as the system of punishments administered by the courts, have not been very effective. But few question the rightness of the treatment they afford; it is the weak human nature of the "guilty" that is at fault! In similar cases, an individual may say, "I certainly gave her a piece of my mind," which was apparently a source of satisfaction, but it may not have solved the difficulty. Others sometimes write letters telling

the recipients what they think of them. Usually such letters should be written, re-read (by the writer) with smiling satisfaction, and then thrown into the waste basket. Someone has characterized the stereotype Puritan as convinced of the divine origin of his pugnacious instincts! If the individual pauses to consider the consequences of aggressive action, which he knows derives from his own frustration, he may decide that some other response is more likely to obtain the results he desires. He does not have to blame others for his own errors of judgment.

Another advantage may be mentioned as important in considering the consequences of a proposed line of action in social situations. Such consideration gives one time to take into account the peculiarities of human nature that he has studied about, the environmental influences to which they have been subjected, the nature of the needs they are attempting to satisfy, and the frustrations that have bedeviled them into various forms of irrational and perhaps immoral conduct. One can forecast more or less accurately how a proposed line of "treatment" would fit into the life pattern of others, and decide, for example, that punishment may not be what a certain individual needs, delightful as the prospect becomes of administering it, but that he has already had too much of one kind or another, perhaps more than any one person can take.

One human characteristic may be used as an example of the conditions that need to be taken into account in determining what is best to do in terms of consequences in a social situation. This involves the expression of the need for security through ego-protection. Certain Oriental peoples have elaborate conventional procedures to "save face," as the phrase is. If one has made a mistake, he doesn't like to have it rubbed in, whether or not he alone is responsible. If directly confronted with his error, he may deny it ("try to lie out of it") or rationalize it in some way, perhaps projecting his error onto someone else. The moralistically inclined person is apt to insist on a full confession of guilt, by implication exonerating and exalting himself to a position of high self-esteem. A better solution may be obtained by foregoing the satisfaction of seeing the victim squirm, perhaps through admission of partial error, or apology. The error can be touched on lightly as of little consequence, or as natural under the circumstances, and the effort made to discover what can best be done about it and how to avoid similar mistakes in the future.

In this discussion of problem-solving in social situations, the emphasis has been placed on evaluating a tentative solution; but nothing has been said about finding a solution that may be evaluated or that may take the

place of those that have been tried and found wanting. The same kinds of sources are available here as in other situations, and the same kinds of mental processes are employed as were described in the chapter on reflective thinking. Ideally, the individual should find his own solution, though he often needs the help of a parent or teacher, or of a guidance worker or clinical psychologist.

Immediate and Delayed Consequences. In a social situation a solution may or may not be effective in attaining the immediate objective. And if the immediate objective is achieved, the more remote goal may or may not be reached. These conditions call for a little clarification, for failure to recognize them often results in unnecessary frustrations.

To use a former illustration, a child may feel the need of recognition and may stick a pin into his classmate to get it. He is successful so far as the immediate objective is concerned: the pin reaches its mark; but still he isn't popular! He needs to have help in determining the more remote consequences of his "solution," and in finding a better one. Similarly, the various efforts children and grown-ups make to obtain security are sometimes immediately effective, but not ultimately satisfactory. Teachers are often concerned about the immediate effect of punishment, but are not so likely to inquire into the more remote consequences. The means employed in attaining the immediate goal often destroy any possibility of obtaining the desired future satisfaction. It has been said that people get what they want but do not want what they get. The reason may be that they erred in thinking that the immediate objective would be satisfying, or it may be that their way of obtaining it, perhaps by trickery and deceit, perhaps by aggressive tactics, arouses disgust or stirs up so much enmity, even if it doesn't get them into the toils of the law, that the consequences are far from satisfying.

It is sometimes urged that young people should learn to forego immediate satisfactions for the more remote goals. But the wisdom of this advice depends on the nature of the remoter goals which are sought. A person may deny himself the satisfaction of telling a customer what he thinks of him in order to cheat him as well as to help him. Or he may undergo tiresome training to become a successful lock-picker or counterfeiter as well as a skilled craftsman or artist. Whether objectionable means are employed for worthy ends or worthy means for antisocial ends, the means and ends constitute one total behavior pattern. The consequences of employing the total pattern must be determined in the process of finding the correct response.

Value Relationships. In general, it can be said that values are different sets of conditions which satisfy human needs, conditions which people call good, that they want, seek out, or strive to produce or to maintain. The different values may be thought of as constituting different worlds. Nobody lives exclusively in one alone; so children have to learn to move about from one to another.

If they are to attain their optimum development, they must be citizens of these value worlds. While they will devote more of their energies to some than to others, the environment should provide the opportunities for varied satisfactions. The following may be considered to be the chief value worlds.[26] After each is a series of questions which serve to indicate some of the relationships in each of these value worlds and to point out some of the responsibilities of the home, the school, and the community respectively in providing for them.

1. The world of activity—strength: health values
    a. Is the child's home health regimen good, e.g., sleep, diet, medical care, absence of overconcern? Is there a need of more health knowledge? If so, what? How might it be obtained?
    b. What is the school situation in regard to the physical education program and equipment, health program, safety, sanitation? How might it be improved?
    c. What are the public health agencies in the community? Are the inspectional and other duties adequately performed? What medical facilities are available? How complete and generally available is the sports program?
2. The world of knowledge—truth: intellectual values
    a. Does the child have books (library or his own) to read at home? Is he encouraged to read, ask questions? Are things he is interested in explained to him? Does he have a hobby? Is there cooperation with the school program?
    b. What is the school situation in regard to equipment, libraries, laboratories, films? Does the school adapt its program to individual differences and emphasize pupil growth as well as competition? Is its program traditional or functional? How is the curriculum determined? What methods are employed?
    c. What educational agencies are available to the community and how satisfactory are they, e.g., schools, libraries, museums? Do they meet the needs of all ages, all classes? Are they available to all?

[26] Eduard Spranger in his *Types of Men*, Halle: Niemeyer, 1928, develops the concept of ideal types based on some of these values as an aspect of *Geisteswissenschaft* psychology, a derivative of the same structural views that have found expression in the postulates and experiments of Gestalt and field theory.

3. The world of appreciation—enjoyment: esthetic values
   a. Is the home as attractive as it can be made (with due respect to the budget)? Do children help in planning any remodeling, planting, interior decoration, dressmaking or selection? Are books and recordings available (by ownership, library arrangement or exchange lending)?
   b. What modifications might be made in the school art program (including music, literature, dramatics, crafts, and the so-called practical arts) to make it more functional, to cultivate appreciation, creativity? What further equipment is needed?
   c. What does the community provide in the way of concerts, and exhibits, and music, art, and dramatic organizations? How can these be encouraged? What others should be developed? What agencies are concerned with city-planning? Are they effective? Do the plans provide for a more attractive community of the future?
4. The world of work—efficiency: economic values
   a. At home, do the children have an opportunity to work? Are they encouraged to earn and to save money, to learn the value of materials, to be wise buyers?
   b. Does the school provide vocational guidance and training, a knowledge of commercial and industrial establishments, worker organizations and the development of technology? Consumer knowledge?
   c. What are the more important industries in your community? What do they contribute? Should there be others?
5. The world of power—status: political values
   a. Is the child learning self-direction and self-discipline through democratic control or developing submissiveness to (or aggressive attitudes against) autocratic domination?
   b. Are democratic procedures practiced in the school through pupil-government techniques so that rights and responsibilities will be understood? Or does cooperation mean doing what teacher says? Are there opportunities for pupil participation in curricular as well as in government activities?
   c. What is the organization of city and county government? What governmental agencies are performing the most commendable services? Where are the weak spots? In what ways do committees, commissions, boards, and interested citizens contribute?
6. The world of helpfulness—altruism: social values
   a. Are there pets or smaller children at home for whom each child can assume part responsibility? Is some work done by each to contribute to the family group?
   b. Does the school provide the psychological services needed by the

children, and provide children with opportunities for helpful contribution to school and community projects?

c. What are the community social agencies and their responsibilities? Are they adequate, well staffed? What further developments are needed?

It is clear from this enumeration that the intellectual values tend to receive more attention than others in the school program, which is probably as it should be. But if children are to receive the help to which they are entitled, as they grow up to take their places in the adult community, the others should not be neglected.

Conflicting Values. Since some people want one kind of thing and others want another, the values sometimes conflict, and the child will have to learn to understand and to choose. Sometimes he may become confused because he hasn't realized he has crossed the boundary from one value world to another. He will hear academic criticisms of athletic programs, political depreciation of academic "brain trusters," social-minded people deploring power politics, industrialists objecting to social security legislation, and artists cynically depicting the bad taste of commercial Babbitts—and so it goes.

How can he tell who is right and who is wrong? For each world there are things that are right and things that are wrong and they are not always the same in different value worlds. For example, in the world of knowledge, a lie is wrong, while in the world of power, it is often right. The child must make his peace, somehow, with these different worlds in which we all live. If he employs the criteria of one value system in a situation where different values obtain, unless he comes to understand the situation, he will be baffled, and his frustration is likely to result in maladjustive responses. If he is to understand the instructions he is given to aid him in his social learning, or if he is to forecast the probable consequences of the tentative solutions of his difficulties and discover those that are satisfactory, he must realize the nature of the controlling traits and attitudes that constitute the value systems of the people with whom he is to deal.

Is it possible to get an objective, nonpartisan view of conflicting values and their related loyalties, one that will provide a place for each in the scheme of things? An approach to such a basis is suggested by a consideration of four types of errors:

1. *Error of excess*, in which a person pursues one value too far; it becomes "too much of a good thing." For example, life is good and one

must eat to live; but when one overeats and dies of apoplexy, he has "done wrong," that is, he has committed the error of excess.

2. *Error of overemphasis*, in which a person pursues one value, not too far, but gives so much time and effort to it that he becomes neglectful of other values. For example, play and exercise are good things, but when one spends so much time at them (though it may be no more than some others spend) that he is unable to do his school or college work, and so fails, he has done wrong, that is, he has committed the error of overemphasis.

3. *Error of neglect*, in which a person through too much attention to other values neglects the one that is more important for him. This is just the other side of the error of overemphasis. For example, a person neglects his health, doesn't get enough sleep or food because he is working so hard in school or to get ahead in business, and so he has a nervous breakdown. He, too, has done wrong, that is, he has committed the error of neglect.

4. *Error of deficiency*, in which a person is below a minimum standard for a value, perhaps through no fault of his own. For example, malnutrition and lack of needed medical care, because they tend to negate the value, are wrong and a person or society which permits such a condition is in error (or it is itself a weak and helpless society).

The error of excess and the error of deficiency are absolute in that they can be determined without considering other values, though people might differ as to the exact place where the lines for the maximum and minimum should be drawn. The error of overemphasis, and the error of neglect are relative, depending on the condition of other values within the middle range between the maximum and minimum.

Table 19 presents the values here discussed in the form of a scale. Within the middle range, between the maximum and minimum lines, an individual or a community may advantageously promote the several values to whatever degree it may desire. But if in any case they are pushed to excess beyond the maximum, or if any of the values are allowed to slip below the minimum into the deficiency column, an error is made. A mistake, perhaps a great wrong, is committed. Within the middle range one individual may concentrate on one set of values for all he is worth, devoting his "entire energy" to the game, to his studies, to his art, to his career in business or politics, or to promoting the welfare of mankind. Another may find greater life satisfaction in cultivating two or more values to a greater or lesser degree. One may place a mark on the scale to indicate the extent of his concern for each of the value systems. The verbal descriptions present only a rough indication of the levels from deficiency to excess.

TABLE 19 *A Scale of Values*

DEFICIENCY	MINIMUM			MAXIMUM EXCESS
	HEALTH Good health, adequate medical care; sanitary conditions			
malnutrition poor medical care unsanitary	safety healthful conditions	play exercise	athletics	indulgence hypochondria
	INTELLECTUAL Universal, compulsory, free education			
illiteracy superstition ignorance	literacy	knowledge general education	scholarship research	pedantry narrow spe- cialization
	ESTHETIC Experience and opportunity for appre- ciation and creativity			
drab blighted area monstrosities	instruction opportunity	artistry appreciation competence	creativity virtuosity	dilettantism narrow interest
	ECONOMIC Opportunity to acquire training for earning a living, according to interest and ability			
pauperism impoverishment	self- support	independence security	wealth for goods and services	exploitation racketeering miserliness
	POLITICAL Education and training for participation in democratic society			
submissiveness enslavement	self- direction rights	power competence influence	control statesman- ship	domination despotism
	SOCIAL Contribution to the cause of individual and general welfare			
neglect rejection discrimination	acceptance equality of opportunity	responsibil- ity participa- tion	humanitari- anism	overprotec- tion paternalism

Some have been concerned about what they call "spiritual values," believing that the schools are perhaps not sufficiently concerned with them. To avoid confusion in thinking, it may be well to distinguish three categories of values: life values, such as have been here discussed, instrumental values or virtues, and religious values.

The instrumental values or virtues are the qualities of the individual that are needed in order to maximize the life values for himself and others within the optimum range. Among them might be listed what are called by some the moral virtues of temperance, justice, and fortitude, to which might be added (though they are not mutually exclusive) such virtues as respect for personality, loyalty, sense of duty, and integrity. These are highly generalized terms that characterize certain classes of specific acts that are called for in specific situations, and that may become habitual. As virtues, they may be thought of as ends in themselves, but they are virtues because by and large they tend to promote the life values already discussed. If a particular act that would ordinarily be placed under the category of some virtue negates life values, it is no longer virtuous. Its classification is open to correction.

The religious values are the proper relationships of man to God as variously defined by the several religious groups. Clearly, the public schools would be stepping outside their rôle to be concerned with these for they lie within the realm of the various churches.

But church and school can whole-heartedly combine their efforts toward furthering the life values and the virtues by means of which they may be attained. The environment can provide opportunity and encouragement. It can provide for choices and decisions and for experiencing the consequences of those decisions. And gradually it will be realized that the virtues in general represent the ways which further the accepted life values, and this is the reason they are considered virtues.

And the church and school can likewise cooperate in helping individuals to discover for themselves the pattern of life values that is most satisfactory for each, and serves to give a meaning to life. To many, such a pattern is essentially religious, whether or not it follows a particular sectarian pattern.

7. Social Learning and the School

Discipline and Deportment. Various aspects of learning in social situations have been discussed. It remains to consider briefly the agencies the school has at its disposal to promote it. The code of the school is supposedly adapted to the stage of development of the children, but in many cases it has been set up with the convenience of the teachers in

view, and parents have approved because the pattern was what they were familiar with as children. Peculiarly enough, rigid regulations instead of favoring those in control, often provoke rebellion, making more trouble than would have arisen if the procedures were better harmonized with child nature. Even in conservative schools, however, the pedantic word "deportment" is less in evidence, and in many the ambiguous word "citizenship" has taken its place. As the concept of this term gradually becomes enlarged in the minds of pupils and teachers, a different school structure tends to evolve. Discipline, meaning what the teacher does to the pupils who don't do what they should, comes to mean a principle of control operating among the pupils themselves. They are given the opportunity to learn how to conduct themselves in various situations.

The two opposing points of view, each stated in a somewhat extreme form to make the antithesis clearer, are ably presented in the following quotation:

I do not believe that boys can be induced to apply themselves with vigor, and, what is much more difficult, perseverance, to dry and irksome studies by the sole force of persuasion and soft words. Much must be done, and much must be learned, by children, for which rigid discipline and known liability to punishment are indispensable as means. It is, no doubt, a very laudable effort in modern teaching to render as much as possible of what the young are required to learn, easy and interesting to them. But when this principle is pushed to the length of not requiring them to learn anything *but* what has been made easy and interesting, one of the chief objects of education is sacrificed. I rejoice in the decline of the old brutal and tyrannical system, which, however, did succeed in enforcing habits of application; but the new, as it seems to me, is training up a race of men who will be incapable of doing anything which is disagreeable to them.

We do not have to wait to learn whether this is a true prophecy, for it was written by the English philosopher, John Stuart Mill, in 1863! In the three generations or so that have followed, many direful things have occurred, but hardly what was prophesied. It may be that Mill succeeded in reversing the trend of "modern teaching," or perhaps teachers were unsuccessful in their attempts to render much of what the young were "required to learn easy and interesting to them"!

We have progressed far since 1863. We have found out about individual differences; so we are not so prone to require pupils to learn what is impossible for them to learn and punish them if they fail. We have

found out about the curriculum, and are less dogmatic about what must be learned by children. We have found out about need and frustration and are dubious as to whether the brutal and tyrannical system did enforce habits of application and are quite certain that it developed less desirable ones. We have learned that it is rarely necessary to try to make tasks "easy and interesting," but rather to find tasks that are not too difficult for them to accomplish and are of recognized value, and note with amazement how pupils apply themselves with vigor and perseverance to what we had considered would be disagreeable, that in meeting felt difficulties and striving for acceptable goals, they will undergo any amount of drudgery. In short, in the process of bringing a larger proportion of the people to a higher educational level than has ever been achieved before, we have found out that the discipline formerly so extolled was in large measure the cause of the difficulties it sought to overcome.

Externally imposed discipline has been weighed in the balance throughout the years and has been found wanting. What is the program for developing desirable conduct? What should it be? American public schools have no separate place in their program for courses in "ethics" or "morals." There is, as a rule, no time set aside for learning how to behave, as there is, for example, in learning how to compute or translate, or even to sing or to play football. With the exception of voluntary discussion groups organized in some schools, and the individual attention given to those who have misbehaved, social learning must take place more or less as a by-product in connection with the regular school subjects and activities.

Effects of Instruction. The results of such instruction as has been given have not been particularly satisfactory at any stage in history. It is, of course, difficult if not impossible to separate the school influences from the others to which the children are subjected. However, the use of the control-group technique has revealed some rather surprising conclusions, some of which may be summarized as follows:[27]

1. Children from the poorer and more crowded sections of cities who test lower in socio-economic status, are also much lower in honesty than those more favorably reared.

2. Children of the same socio-economic status and the same age and

[27] H. Hartshorne and M. A. May, *Studies in the Nature of Character.* I. *Studies in Deceit,* 1928, Chapter XXIII; *Studies in Service and Self-Control,* 1929, Chapters XV, XXIX; *Studies in the Organization of Character,* 1930, Chapters XXVII, XXVIII.

grade tend to conform to the conditions of their schoolroom: in some rooms honesty is the rule, in others, dishonesty, thus indicating the influence of the teacher and group morale.

3. Groups of children equated for other variables which would influence the results but differing in that some had received one or another of two well-known systems of character instruction showed that those who had received the training, so far as honesty as measured by the tests was concerned, were quite as dishonest and often more so than those who had not, and that in some cases, the longer they had received the so-called character instruction, the more dishonest they were.

4. There was practically no greater honesty among those who attended Sunday School than among those who did not, that could not easily be accounted for by their home background.

Such results as these point to the futility of continuing moral instruction in the dark, as it has been done in the past, and the necessity of developing further tests and conducting extensive studies to determine the outcomes of the most promising kinds of instruction. The school, more than ever before, has the opportunity to do this; indeed, the responsibility is being thrust upon it. As in the school subjects, it cannot, in fairness, permit any more of the ignorant trying-out now of this idea and now of that, with no check on the results obtained. One occasionally hears of parents who "do not want their children experimented on." Children have always been experimented on, too often by the ignorant and the untrained. Now scientific method is being brought to bear, and the result is bound to be a wiser selection of materials and method made by those who by nature and training are qualified to judge impartially on the basis of precise data.

Similar extensive and thorough studies were made of two other traits, one of which was called *service,* cooperation, or charity, which contrasts work for self and work for others; the other was *self-control,* persistence or inhibition, which, following the definition of Roback, "contrasts the tendency to continue an approved act, with resistance to the tendency to engage in an interesting but disapproved act." Both of these traits were measured in ingenious ways. Certain general conclusions may be drawn from this work:

1. The influence of family or kinship is regularly important, though whether it is due to biological or to social factors the tests do not show.

2. Classroom morale and some other controllable factors sometimes work detrimentally, a condition which should be subject to correction.

3. A number of factors such as physical condition, regularity of attendance at Sunday School, club membership, sociability, and the like are not so highly correlated with the character traits tested as is commonly supposed.

Importance of the Teacher. First in importance in social learning is the teacher. At school, the teacher stands *in loco parentis,* and often quite unwittingly wields considerable power for good or ill. The teacher's influence is often quite obvious in matters of etiquette. The manners of different groups differ, and teachers may be blind to their own shortcomings and lose any influence and effectiveness they might otherwise possess. There is the authentic case of the fifth-grade pupil who remonstrated with her mother about inviting the teacher home to dinner, saying, "Mother, I wouldn't have that woman in our house; she is too crude." And if that looks like snobbishness, which it was not, there are other indictments; for example, the one of the child who feared teachers, a modest narrator who pictures the effect the brutish manners of some of her instructors had upon her.[28]

More important is the mental hygiene aspect of the pupil-teacher relationship. As pointed out earlier (Chapter II), the teacher with neurotic symptoms is likely to have a larger proportion than normal of pupils with neurotic symptoms. And, conversely, the teacher who has made a healthy adjustment to life, who is a well-integrated personality, will tend to create the same kind of healthy climate in the classroom. Furthermore, as mentioned in the previous section, the average school honesty scores of children tend to vary from one classroom to another more than would be expected from the influence of any outside variable. We are not quite sure what qualities of a teacher's personality influence the honesty or dishonesty of pupils, but a series of careful studies reveals how specific things that teachers say and do have a direct bearing on the kinds of social response habits that pupils acquire.

In these studies, what is called dominative and integrative behavior was studied, as it was found in teachers and pupils by the time-sampling technique.[29] Dominative behavior is described as involving the use of force, commands, threats, shame, and blame (all attacks against the personality status of the individual), and is characterized by rigidity or inflexibility of purpose as against others' desires, purposes, or judgment in determining goals which concern them.

[28] W. C. Trow, "A Child Who Feared Teachers," *Journal of Educational Sociology,* vol. 3 (June, 1930), 590–601.
[29] H. H. Anderson and others, "Studies of Teachers' Classroom Personalities," *Applied Psychology Monographs,* vol. 1, No. 6, 1945; vol. 2, No. 8, 1946; vol. 3, No. 11, 1946.

Three levels are distinguished: *DC—Domination with evidence of conflict* (e.g., "Don't do it that way," "I think you are being silly," "Go on out and stand in the hall"); *DN—Domination with no evidence of conflict* (e.g., "I want you to read this," "Back to your seats," "Think hard," "I hope you will sing it that way," also directions and questions); *DT—Domination in working together.* (The teacher retains her "right" to make decisions but works with an expressed desire of the child, e.g., "I promised Bobby he could erase this time," "That's better," the teacher selects the child for activity, etc.)

Socially integrative behavior is described as the sort in which one asks, requests, explains, makes a request meaningful to the other, and attempts to discover common purposes. It is flexible, adaptive, objective, scientific, and democratic.

Two levels are distinguished: *IN—Integration with no evidence of working together* (e.g., "You know what we were talking about this morning," "I'll make mine like this," "I'll just give you an idea"); *IT—Integration with evidence of working together* (e.g., "Can anyone help John?" "I can understand how you made that mistake," "Excuse me, I didn't know Benny was so close behind me," "What do you think we should do with our garden?", also answers to pupil questions, expressions of approval, thanks, questions regarding a child's expressed interest, etc.).

Obviously no teacher should seek to avoid all dominating behavior. But when the large proportion of teacher-pupil contacts are of this sort, the pupil's behavior is similar toward the teacher and toward the members of his peer groups. This was revealed by studies of the same pupils two successive years under different teachers. With the more dominating teacher, there was more nonconforming pupil behavior, which produced more dominating efforts by the teacher, thus setting up a vicious circle. On the other hand, with the more integrative type of control, the pupils made more voluntary suggestions, and expressed a more frequent desire to do or say something (by show of hands), and there were more expressions of appreciation, more social contributions, and more reports of experiences in response to open invitations. These were mostly kindergarten and second- and third-grade children, but it is probable that similar conditions obtain at all age levels. With the dominative type of control, children gradually learn to escape, evade, to disobey, to rebel. Over the years—not by one situation or by one teacher—they are taught these things. Now we know a little more about the process. But we also know more about the process by which children learn the ways of democratic participation and cooperation.

The different kinds of situations that provide the opportunities for social learning which are under the control of the teacher may be classified for convenience as follows: the rating program, the verbal instruction program, the physical education program, the arts program, the pupil organization program, the school government program, the program of community participation, and the guidance program.

The Rating Program. A peculiar practice has developed in many schools of marking pupils on what is called citizenship, though the term is vaguely defined, sometimes meaning proper deportment, to use the obsolescent term applying to the supposed virtue of passive compliance with school regulations and teacher commands, and sometimes meaning more active participation in school activities.

Those who urge the use of marking systems for citizenship and its subsumed virtues contend that it leaves the academic mark for a more exact estimate of academic performance apart from moral conduct, that it calls attention to desirable forms of behavior, and forms a basis for various awards. Those who question its value point out that it is putting the cart before the horse to evaluate the results of teaching what isn't taught, that the ratings are subjective and invalid, that they have little influence on the pupils who need help the most, that they encourage surface politeness and "apple polishing," without influencing more fundamental behavior, and that awards based on such marks are meaningless and of little influence since all but a very few pupils are out of the running before they start.

It is unnecessary here to make any detailed suggestions for improving the situation since they would involve much that has preceded the present discussion in this book. When the objectives are clearly set forth and the means worked out for giving instruction that they may be attained, then by employing adequate evaluation techniques it would be possible to discover the extent to which pupils have improved in the direction of these objectives.

The Verbal Instruction Program. The so-called regular school subjects have been the chief reliance in the past for such development of "character" as the schools sought to bring about, supplemented, of course, by disciplinary controls and moral adjurations. While the attempt to inculcate proper behavior by verbal means alone is as unlikely to succeed as would be similar attempts to develop motor skill, nevertheless we should not rush to the other extreme of attempting to eliminate all verbalism, or even of neglecting or depreciating the value of the school subjects in this area.

Curricular Program. The school subjects offer many opportunities to discuss problems of conduct and to arrive at a better understanding of their nature. Literature and history are replete with the names of the illustrious to encourage emulation as well as of those who have chosen wrongly and so offend against a youthful sense of justice and honor. Good teaching will inspire thought along these lines which will not be forced, will not have the appearance of moralizing, and which may be none the less effective for being touched on briefly. Such instruction is far richer and more interesting than the flat and meager sort which hammers only at learning the "facts."

Undoubtedly, the hope that the regular subjects have such values is in part responsible for some of the present curricular content. What is learned may transfer to the life out of school and go into the making of better-adjusted citizens—men and women who know themselves and their world, and can adequately meet the problems which confront them in it. Admittedly, the school subjects have been so used in the past, but in a desultory sort of way. It is reasonable to suppose that in the future the possibilities for such instruction will be more carefully charted, that certain kinds of behavior will be studied in connection with specific parts of different subjects, and that teachers in the later school years can build upon what they know has gone before, approaching the same problems again and again from different angles, but without the pupils' realizing the planning that lies behind their class work.

The school subjects also furnish an opportunity for actual practice in the performance of the kind of acts desired. Too often the opposite is found, and habits of sloth, evasion, and deceit are developed instead of industry, perseverance, and integrity. But with the presentation of the right stimulus situations, the development of the correct set, the battle is more than half won. The teacher needs to think of a subject less as an end in itself and more as an instrument for the development of generalizations and ideals. For only as these are achieved, especially on the high-school level, does their work have any real reason for being. Here is found the very core of transference, here the place of teaching as an art.

A few suggestions even without reference to the values of the different subjects may make the above generalities more specific. Courtesy and freedom from self-consciousness may be developed in group discussions; habits of neatness, accuracy, and honesty in written work; habits of anticipating tasks and planning ahead, and hence choosing the remoter good instead of the immediate pleasure, in the preparation for examinations; attitudes of enthusiasm for work, if it is consonant with

abilities; habits of inquiry to satisfy intellectual curiosity, if good reference books are available; habits of enjoyment from good friends and good books, from art and music, if stultifying compulsion is removed; experience in democratic participation in class organization and class projects—all these and many more may be developed. Will they "transfer" to the life out of school? Perhaps not very much, but, if such ends are diligently sought, certainly much more than we have even dared to hope.

The Physical Education Program. There is scarcely a virtue in the calendar that is not developed by physical education, if its enthusiasts are to be believed. And there is substantial foundation for the claims that the program affords an excellent opportunity for pupils to acquire commendable social habits and develop desirable traits of character. However, before it is affirmed that the opportunities are fully taken advantage of, and that a physical education program actually does result in improved social adaptation and moral conduct, it is advisable that a more careful study of the whole problem be made, perhaps along the line of such tentative hypotheses as these:

1. Athletic games furnish pleasure which makes for a more genuine enjoyment of life.
2. They develop muscles and sensorimotor coordinations which add strength and poise, and make it possible to meet physical emergencies more adequately.
3. They develop habits of cooperation and responsibility which may (or may not) transfer to other situations.
4. They furnish opportunities for conferences with and idealizations of leaders and coaches which are valuable if the older persons are worthy, but distinctly harmful if they are not.
5. They develop habits of playing only to win, which may (or may not) transfer to other situations.

The case for the physical education program as a character-building agency, then, lies first in the opportunity to satisfy needs for activity and mastery not afforded by the work with verbal and numerical symbols which constitutes the chief load of the traditional school subjects; secondly, in the large number of patterns of social behavior that appear—both competitive and cooperative, which furnish an occasion for instruction in the correct or socially accepted forms; and, thirdly, in the influence of the director or coach whose relationship with the pupils is apt to be more personal than that of the other teachers, and who

for various reasons is likely to have more prestige. Problems are often brought to him that pupils would not think of divulging to anyone else. If he is trained to handle such cases, his influence will be all the more effective.

The Arts Program. The opportunities for social learning are somewhat similar in the manual and fine arts program. The shop and studio correspond to the gymnasium or playground in the opportunities they provide for freedom of movement and intra-group reactions. Musical and dramatic organizations provide for the same kind of discipline of the individual to the demands of the total performance. There are similar opportunities for individual work with pupils in order to help them in their specific difficulties, and there is a similar release and opportunity for compensatory self-expression for those whose interests do not lie along academic lines. There is a similar satisfaction in developing motor skills in performance, and the joy that comes to many in work with things and in the cultivation of esthetic values.

Pupil Organization Program. The program for pupil organization overlaps most of those that have been mentioned and includes others besides, like those of the homeroom and school clubs. They have unity in that they are occasions for the display of initiative in social situations and for practice in democratic group participation. Regular classes may have their officers who take charge of routine matters and assume control in the absence of the teacher, and their committees that develop class projects. Even in the more traditional subject-matter areas, some classes are conducted in such a way as to resemble an adult club with the teacher as the invited speaker or resource person more closely than they do a typical class in school.

Few schools exploit the possibilities of the homeroom periods as they might. Instead of being merely a time when attendance is checked, announcements made, and desultory last-minute studying is done, they can be the nerve centers for democratic control, the New England town meeting of the school organization, in which experience of individual effectiveness in group action and the most valuable opportunities for social learning can be provided. Similarly, informally organized hobby clubs and special interest groups, if not teacher dominated, can provide opportunity for the practice of leadership on the part of many who are capable of developing leadership though not interested in the more active or overt sort called for in group games or in student politics.

In all of these, through the influence of the teacher and the other pupils, individuals learn how to get on together by following the com-

monly accepted ways of social intercourse. Selfishness, bad temper, rudeness, dishonesty, and the like are given a chance to appear and to be pointed out as errors, while more acceptable modes of behavior are acquired. It should perhaps be emphasized that the mere existence of a system of homerooms and of special interest clubs that can be pointed to with pride by the principal when visitors arrive at the school gives no assurance that social learning of an acceptable sort is going on. They may be as teacher-dominated as the most traditional class. But they provide the occasion for social learning, and through the development of experience in democratic participation may constitute an intermediate step between complete autocratic control and democratic school government.

School Government Program. Probably no phase of public education is in a more disorganized state than school government. Its form ranges from complete and dictatorial control on the part of the principal or superintendent with "obedient" pupils and cringing teachers, to a disintegrated laissez-faire policy so out of hand that an aroused citizenry yells for blood, and "readjustments" in the administrative and teaching staffs follow. An individual school is apt to swing back and forth in its type of control and extent of pupil participation with administrative and teaching personnel changes.

Much of the difficulty lies in the fact that teachers and administrators do not always realize that the function of student government is not to manage the school but to afford the occasion for the pupils to learn how to govern themselves. It provides a learning situation, in the same way that a reading class or football practice is a learning situation. It is sometimes mistakenly assumed that the pupils have more competence than should be expected at their stage of development. When given too much responsibility, they make errors, there is trouble, and the whole system is likely to be abandoned. Any plan of student government should be so set up that errors can be made without too serious consequences, as is the case in other fields of learning.

For the able administrator, there is an element of frustration in turning over the management of a school enterprise like a school party or an athletic contest to a group of immature pupils with the realization that they will probably mess it up—forget to order the refreshments, or not get the tickets printed in time. He can manage it so perfectly, and everything will click. The coach perhaps feels the same way sometimes. Why should he work so hard to train young people to do what he can do so easily? Or why should the teacher help the pupils to understand in part

what he appreciates so fully? Stated in this way the situation seems highly ridiculous. The only distinction, however, lies in the acceptance of the proposition that student government is a learning situation.

If this proposition is accepted, it naturally follows that individual differences must be recognized, that simpler tasks must precede the more difficult, that pupils must be helped to perceive the implications of the various aspects of the social interrelationships with which they are to deal, that they must be taught routine matters of management and administration and that they must learn to discuss problems that call for group discussion and arrive at plans for group action. There is probably no more important phase of instruction in the whole school than this, and the principals and teachers who can provide it are making a real contribution to American democracy.

The specific form which the government should take is largely immaterial. It should probably reach down into the class or homeroom organization. It should be built up and expounded by the students themselves and guided by the teacher or teachers to whom this responsibility has been assigned. It might be better for the pupils to work out a poor constitution and correct the faults that appear by amendment and revision than to have a perfect document handed to them to adopt.

In a democracy, *spheres of power* are generally recognized, in local, state, and national government, and in the several bureaus, agencies, and authorities that have developed. Similarly, pupils may learn that they share power with the teachers, the administration, school board, community, and state. (Teacher groups who sometimes think of themselves as the sole determiners of the school program have not learned this important fact.) On this basis, the student government would act within the limits of its responsibilities, with the power to make requests or recommendations to faculty, superintendent, or board of education.

In some of the more democratically organized industries, a system of *multiple management* has been set up which corresponds to what in education is called *cooperative planning* and sometimes *school government*.[30] Each major group, the teachers, the parents, the pupils, and, in larger systems, the nonteaching personnel, have an elected board or council with a rotating membership to discuss school policy as it relates to them and make recommendations to the board of education. In some school systems representatives of all groups including the board of education form the governing body. At regular intervals a combined meeting of the boards or representatives is held for the consideration

[30] T. T. Herrick, *School Patterns for Citizenship Training*, Ann Arbor: Bureau of Educational Reference and Research, 1947, II.

of problems of common concern. The basis for such a plan is already laid in faculty groups, parent-teacher associations, and student councils. Some cities already have their all-city student council and all-city teachers council. All that is needed in many places is further development and integration. The task of developing such a plan is a challenging one, with many rewards and satisfactions in the form of mutual understanding and cooperative endeavor which characterize the more democratic type of organization.

Community Participation. Many schools have gone outside the walls to provide opportunities for social learning through participation in various projects with members of the adult community. Among the projects which different schools have developed are excursions, community surveys, consultation with city governing groups (in matters of traffic safety, juvenile delinquency, recreational programs, and city planning), the operation of youth centers, and participation in community festivals. Many of such activities could be carried on by pupils who may be said to have passed from the apprentice to the journeyman stage in social competence. However, there are opportunities for the younger and the less adept to participate in the planning, to learn how things are accomplished, and to develop their own competence.

The Guidance Program. Though much of the school program bearing on social learning is carried on in groups, arrangements of various sorts are made for conferences with pupils to aid them in solving their individual problems. The term guidance is used rather indiscriminately to apply to all phases of this work. There is an advantage in limiting the meaning of this term to cases in which the counselor assists the pupil to make certain life choices.[31] On this basis four areas are distinguished in which guidance operates and for which specialized training is needed. These are the vocational, educational, recreational, and civic. So defined, the guidance activity consists of the process of aiding the individual to choose, prepare for, enter upon, and progress in the activities that are suited to his personal aptitudes, interests, and other characteristics. All else in this area would then be either teaching or pupil personnel work. This latter is defined as follows:

Pupil personnel work consists of those activities of a school or school system whose controlling purpose is to bring each pupil of the community into the educational environment of the schools in such con-

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[31] G. E. Myers, *Principles and Techniques of Vocational Guidance*, New York: McGraw-Hill, 1941, II.

dition and under such circumstances as will enable him to obtain the maximum of the desired development from his environment.[32]

However, in the actual school situation, the teaching, guidance, and pupil personnel functions of the teacher tend to converge, for example, when a child complains that she isn't popular and bursts into tears. The counselor's task is to help the child to learn in the social environment and bring about a better adjustment. The teacher becomes a psychological case worker (Chapter III) in the educational field, a practicing educational psychologist. Whether it is closer to teaching in one direction or pupil personnel work in the other, the work of the educational psychologist in the school may be viewed in one of three categories corresponding roughly to the three stages of craftsmanship—apprentice, journeyman, and master workman.

The educational psychologist as apprentice should first be a master teacher. His chief responsibility should be teaching. But he should be able to assist pupils with their difficulties in social adjustment, as a part of his work with his regular classes, and more particularly in connection with the homeroom he may have in his charge, or the pupil organization and activities he may sponsor. He should know from experience and training the nature of children and adolescents, and the structure and functions of the social organizations in school and in the wider community that are set up to deal with their problems.

The educational psychologist as journeyman should know this and more. In addition, whether he gives part or full time to personnel work, he should be skilled in the use of those techniques of measurement and of counseling that have been developed, not only to provide the best educational environment and experiences for all the pupils, but also to attack the problems of the more troublesome cases, and work with those children toward the solution of their problems. He should know how to select and administer mental and educational tests, interpret the results, and, by skillful interviews with children, teachers, parents, and representatives of social agencies, provide the kind of school environment that promotes the development of well-adjusted personalities.

The educational psychologist as master workman should not only be able to do these things, but he should also have sufficient command of his subject matter to be able to administer an evaluation program for a city school system or other large area, and to modify and develop clinical instruments for various purposes, and so make his own contributions to existing knowledge.

[32] G. E. Myers, *op. cit.*, p. 47.

The psychological clinic, if it is set up as a part of the school program, would be expected to deal primarily with the more severe cases of maladjustment. Freed from any disciplinary rôle, it should have the confidence of the pupils so that they may feel free to come for advice or understanding help if they get into difficulties with their teachers, parents, or schoolmates, without fearing wrath and punishment for their misdemeanors, be they great or small. Learning in the social environment is in many ways most difficult, and the casual and unintelligent attention it has received in the past by untrained teachers and administrators is giving way gradually. More and more of those in responsible positions are recognizing the importance of the problems of social learning involved, and are working out appropriate techniques and procedures for dealing with them.

In Summary

The school has no more important task than that of aiding children and young people in social learning and adjustment. If it is successful in this respect, its other tasks are relatively simple; but if it is not, they are rendered meaningless and futile. It has the responsibility for developing the ability of pupils to participate constructively in group enterprise since at all levels from the local to the international problems of group action, if they are to be adequately met, call for the active participation of well-adjusted, well-integrated individuals who are able and willing to work together for the common good.

Many social influences serve to reinforce and supplement the efforts of the school, such as the folkways and mores and their expression in laws and regulations. But many unfamiliar situations challenge the learner and will continue to do so because of the complexity of their interrelationships that have not been organized so systematically as the regular subjects of the curriculum. Efforts at what may be called remedial work, that is, making up for incorrect habits previously established, through correctional and re-education programs, could probably be much more effective than they are. But, ideally, the wrong habits should not have been allowed to develop in the first place.

There is probably a greater need for adapting instruction to the wide range of differences among individuals, whether their causes are primarily hereditary or environmental, than is necessary in symbolic, motor, or esthetic learning. The definition and measurement of various types and traits provide initial help, as does the breaking-down of the concepts of character and personality into behavior patterns that can be better understood and dealt with.

Many kinds of social situations call for more or less conventional responses, and for these the task of the teacher is to help the pupil to perceive the situation and associate the correct response with it through rewarding experiences. The perception of specific social relations is subject to the same sensory and motivational factors as is the perception of simpler patterns. But they need to be perceived in at least four dimensions—the developmental, the directional, the interactional, and the observational. Many procedures have been employed to connect the correct response with perceived social situations—precept, example, inspirational talks, codes, and discussions—depending for their effectiveness largely on the way in which they are administered. As in other learning, positive directions as a rule are more effective than negative, and rewarded responses tend to be repeated and become habituated.

Since schools cannot possibly provide practice in all the variety of situations which the pupil will meet either during his school days or afterwards, he will have to learn how to find the correct response himself, which will call into play his abilities in solving problems. Here it is necessary to choose between immediate and delayed consequences and to weigh value relationships. The delineation of certain categories of values are indicated: health, intellectual, esthetic, economic, political, and social. With these as a base, errors of deficiency and excess are distinguished when individual or group behavior extends beyond an optimum range in either direction, and the usual virtues are regarded as means for the attainment of values.

For the school program, a highly moralistic approach is often found to be ineffective except possibly for the ego-protection of the teacher or administrator. Some fairly common school practices actually tend to promote maladjustment and even delinquency. A purely verbal program (e.g., morals as a school subject) would probably be equally ineffective. Instead, instruction and practice in desirable social behavior can be provided throughout the whole program of school activities, and particularly in those where there is more opportunity for group interaction, as, for example in physical education, in the arts, in pupil organizations, in school government, in community participation, and also in the guidance program.

In Conclusion

And now it is perhaps clearer than at first what educational psychology "is all about." The school is a great social institution maintained at great cost that both the individual and society may profit. The history of education is the story of how it has operated in earlier and different

cultures—the fascinating account of the crystallization of the ideals of an age into an institution for the propagation of those ideals. The philosophy of education is the consideration of basic principles in the light of modern knowledge and the result of their application to educational procedure. Administration is a study of the engineering, of the machinery of the huge institution, the technique of running it. Method refers to the skills by means of which the empirical and scientific principles constituting the social heritage are brought into contact with the individuals of the living generation. The curriculum is the various activities engaged in by the pupils, experience in which is considered desirable for the individual at the time and for his later good.

Educational psychology is not one of these but it permeates all. It is the study of the individual and the process by which changes are made in him to the end that he can more adequately adjust to the natural and social order. People differ on what these changes shall be, and the means employed to make them, and in a period of transition in a complex culture like our own there is bound to be considerable disagreement.

We do know something of the basic human constitution with certain of its functions predetermined by inherited structural patterns. We know, also, that individuals differ in certain fairly adequately measured amounts in their abilities and capacities for improvement. We know, further, something of the processes of learning by which they acquire what they can acquire.

Educational psychologists seek more exact knowledge of the differences in inherited nature and of the nature of the learning process by means of the scientific method. They seek it that it may be of use in the school, and their findings have played a major part in the tremendous changes education has undergone in the past score of years. Thus far, we have but made a beginning of the study of society's part in the adjustment of the individual to his natural and social environment. But the work is constantly being carried forward. Each teacher can contribute a part, and, if he does his work well, he will gradually come to realize that education is a great task, a glorious enterprise, and a perpetual challenge.

Questions

1. Why do you suppose teachers as a rule have less patience with errors in social learning than with other forms?
2. Give examples of (*a*) a too restricted environment; (*b*) a too complex environment, for a child of a particular age.

3. What problems are presented in a re-education program that are not found in an educational program?
4. Discuss the value of the three definitions of character.
5. What effect do you think the preaching, talks, high-school commencement addresses, etc., you have heard have had upon your character? Account, if possible, for the successes and failures of some of them.
6. What are the values and weaknesses of verbal instructions in social learning? Do they hold for other kinds?
7. What kind of advice and guidance would you give to a child who complains of not being popular?
8. What mistakes are teachers apt to make in dealing with problem children?
9. Endeavor to explain the unsocial behavior of some child of your acquaintance.
10. In what ways do you think you can use the subject you are planning to teach as an instrument to promote social learning? Be specific.
11. Discuss the significance of perceiving, conditioning, and problem-solving in social learning.

Readings

A number of the references cited for Chapter III are applicable here, e.g., Chambers, National Educational Association, Olsen, Pendry, Pierce, Prall, Skinner, Sumner, Thorndike, Waller. In addition, the following deal with various aspects of social learning:

Allport, Gordon W. *Personality: A Psychological Interpretation.* New York: Holt, 1937.
A detailed and scholarly presentation of the functional dynamic view of personality.
Charters, W. W. *The Teaching of Ideals.* New York: Macmillan, 1927.
A pleasant little volume suggesting instructional procedures.
Dewey, John. *Human Nature and Conduct.* New York: Holt, 1922.
America's foremost philosopher discusses the problem of adjustment.
Garrison, S. C. *Fundamentals of Psychology in Secondary Education.* New York: Prentice-Hall, 1936.
Chapters XXIII and XXIV discuss the psychology of character and personality organization.
Herrick, Theral T. *School Patterns for Citizenship Training.* Ann Arbor: Bureau of Reference and Research, School of Education, University of Michigan, 1947.
An excellent little volume reporting and evaluating practices commonly found in operation.

John Dewey Society. *The Public Schools and Spiritual Values.* (*Seventh Yearbook,* edited by J. S. Brubacher.) New York: Harper, 1944.
Chapters VII and VIII, "School Practice" and "Spiritual Values," have the most concrete suggestions.

Kelley, E. C., and R. C. Faunce. *Your School and Its Government.* New York: National Self-Government Committee, 1945.
A very practical 27-page pamphlet with helpful "do's and don'ts" for setting up school government.

Michigan Study of the Secondary School Curriculum. *Youth Learns to Assume Responsibility.* Lansing: State Board of Education, 1944.
"A handbook on experiencing the ways of elementary school." Full of good suggestions.

National Education Association, Department of Elementary School Principals. *How To Know and How To Use Your Community.* Washington, 1942.
Practical suggestions for ways of studying a community.

National Education Association, Department of Secondary School Principals. *The Student Council in the Secondary School.* Washington, 1944.
A bulletin reporting and evaluating current practice.

National Education Association, Educational Policies Commission and the American Association of School Administrators. *Learning the Ways of Democracy.* Washington, 1940.
Six types of "democratic schools" are vividly described and evaluated.

Roback, A. A. *The Psychology of Character.* New York: Harcourt, 1927.
A scholarly report of characterological delineations through the ages. It develops the definition of character in terms of inhibition.

Thorpe, Louis P. *Psychological Foundations of Personality.* New York: McGraw-Hill, 1938.
Excellent systematic treatment. Chapter I, "The Concept of Personality," clarifies a number of related concepts.

Williamson, E. G., and M. E. Hahn. *Introduction to High School Counseling.* New York: McGraw-Hill, 1940.
Presents for students and teachers an excellent outline of the broad scope of student personnel work in high schools.

Wilson, Howard E. *Education for Citizenship.* New York: McGraw-Hill, 1938.
Chapter II, "Evidences of Civic Competence," and Chapter VIII, "School as Experience in Living," are particularly good.

Young, K. *Source Book for Social Psychology.* New York: Knopf, 1944.
See especially Chapter V, "Personality."

Index

Abbott, A., 661

Ability, to learn as intelligence, 283; primary, 287; indicated by standardized tests, 297; grouping, 305; and personality types, 688. *See also* Intelligence

Abnormal psychology, vocational opportunities in, 7

Abnormality, psychological, 197–201

Abstraction, reification of, 131; and intelligence, 283; and analysis, 377, 476; of sensory patterns, 378; of conceptual patterns, 403–404; reification, personification, deification of, 469; of esthetic patterns, 637–639

Acceleration, administrative schemes to facilitate, 304–305; negative and positive, 592–593

Accidens, Aristotelian, and retention, 506–507

Accomplishment, joy in, 172–173

Achievement tests, objectives of, 327–328, 361–362. *See also* Tests *and* Testing

Activities, teacher-pupil, 46; and social learning, 729–732

Activity, basic need for, 580; value-world of, 715

Adaptive behavior, as learning, development of, 129. *See also* Learning

Adaptation, intelligence as, 282. *See also* Intelligence *and* Learning

Addison's disease, 158

Adjustment, mechanisms of emotional, 189–219; of teacher, 220; through home and school cooperation, 220–221; guidance and, 222–223; ideals in, 223–224; intelligence as, 282; in adolescence, 254–255; heredity and, 677; to environmental conditions, 677–678; psychological influences on, 678–679; and educational methods, 680; to unfamiliarity, 681; to in-creasing complexity, 681–682; folkways in, 682–683; mores in, 684

Adler, A., 205–206, 686

Administration, teacher's relationship to, 25–27; functions of, 27; democratic vs. autocratic, 72; of standardized tests, 297, 299

Adolescence, physical changes of, 254; adjustment during, 254–255

Adrenal glands, 158

Adrenalin, 158

Aesop, fables of, 707

Affectivity, pleasantness and unpleasantness, 101–103; and emotion, 151; and learning, 426–428; and esthetic experience, 632–635, 641; and elements of esthetic structure, 646–652. *See also* Emotion

Age, maximum growth or MG, 256–264; units of, 269–270; mental, 291–292; chronological, 292; educational, 357–358; factor in motor skills, 606

Aggression, forms of, 208–212; and teacher, 209–212. *See also* Ascendance, submission

Aids, to instruction: visual, 392–393; auditory, 394–395; kinesthetic, 395–396

Age differences, in learning and remembering, 494; in physical skills, 606

Aiken, W. M., 75, 363

Aldrich, C. A., 120–121

Aldrich, M. M., 120–121

Allport, F. H., 692

Allport, G., 193, 690–692, 698–699

Ambivert, 687

Amnesia, 200

Analerotic type, 688

Analogy, of response, 375; in problem-solving, 460, 464–465, 466; in transfer of identical components, 519

Analysis, and abstraction, 377, 476

Anderson, H. H., 724